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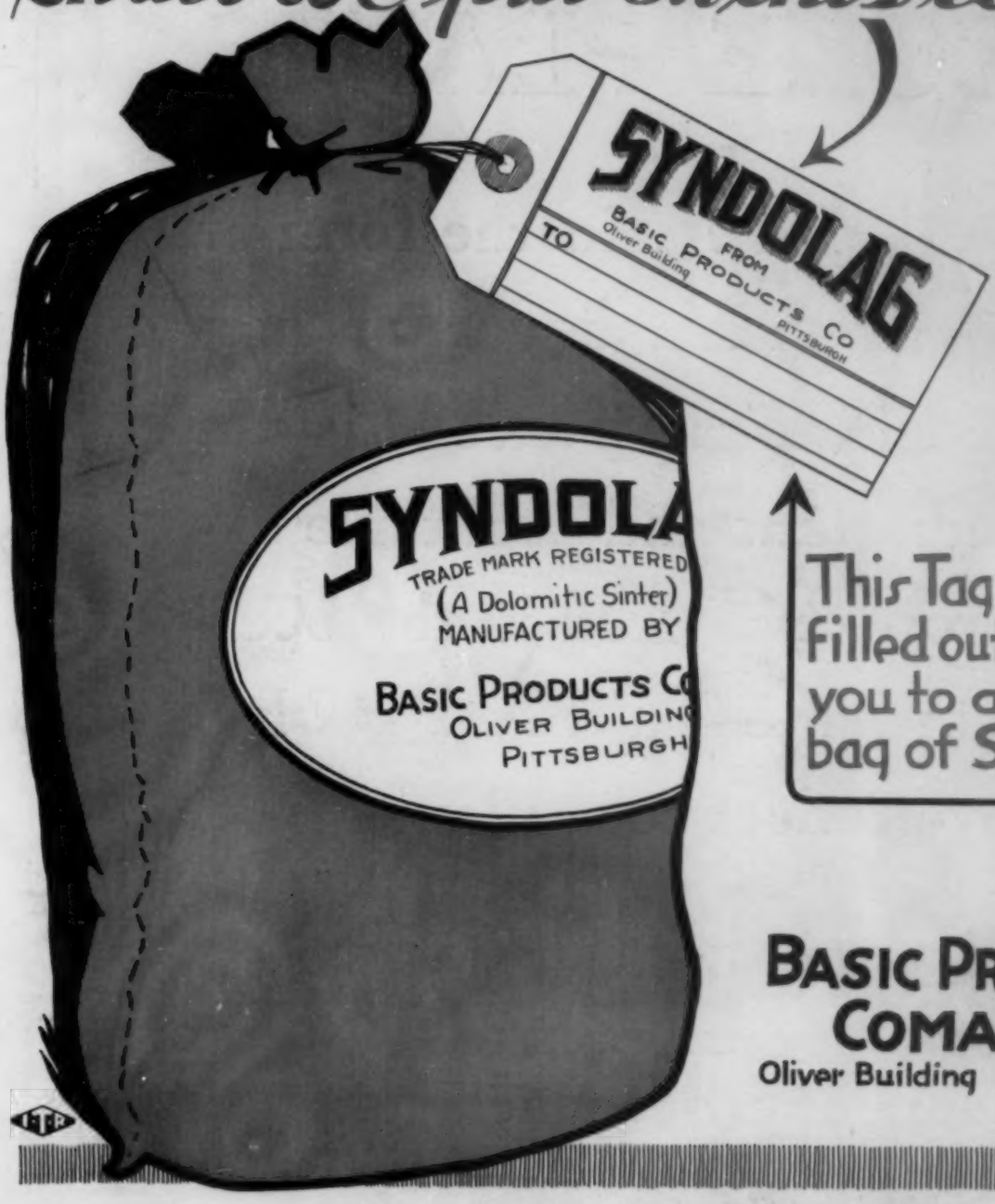

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THE IRON TRADE REVIEW

Vol. LX Cleveland, June 21, 1917 No. 25

High Price Records Steadily Broken

Unprecedented Conditions With Demand Exceeding Supply Producing Uninterrupted Advancing Movement—Fifty Dollar Pig Iron General in North—Controversy Over Ship Steel Prices Reaches a Climax

POWERFUL forces, over which producers and consumers have little or no control, continue to direct the course of the iron and steel market. In raw materials, particularly pig iron and scrap, a demand which far exceeds the supply is producing a kaleidoscopic action of record-breaking prices. Each week is eclipsing the high marks of the preceding one. In finished steel, the domination of government requirements is so far reaching that virtually all buying and selling fast is becoming completely subject to war considerations. The prospect of government needs expanding by leaps and bounds is leading a growing number of makers to abandon all open quotations. Outside buying is being left more and more to its own resources, though the mills are making earnest efforts to guard against permanent injury to established lines of business.

Iron Buyers Face Problem

Between rapidly shrinking supplies and unprecedented prices, which continue to rise, buyers of pig iron are facing a trying dilemma. Quick decisions are being forced by conditions and conservative policies are difficult to pursue. The market remains extraordinarily strong, though by contrast has been more orderly than the preceding week of unparalleled advances and excited buying. Sales have not been so heavy, but have brought new advances of from $2 to $5 in all producing territories. More bessemer has been sold at $55, valley, and malleable and foundry also have gone at this figure for this year and at $53 for next. Fair tonnages of basic have been closed at $50 to $52, valley. A St. Louis steelmaker is inquiring for 20,000 tons. Southern Ohio is quoted from $52 to $55, furnace. Eastern and central Pennsylvania makers have fixed upon $50 as their minimum. Buffalo ranges from $50 to $53. Alabama has joined in the movement with a rush and is up to $42 to $45, Birmingham. Southern Ohio silvery has been sold at $70, furnace, for next year, and bessemer ferrosilicon at $90, furnace. Difficulty in getting iron from various furnaces, even for delivery by July of next year, is impelling some consumers to undertake new lengths in future buying. An increasing amount of scattered inquiry for the third quarter and last half of next year, or 15 to 18 months ahead, is appearing. This has been especially noticeable in foundry and malleable and with middle western makers, who have only 2 to 4 per cent of capacity unsold at the outside to mid-year of 1918. There are reports of some sales for delivery after July of next year. Generally, however, producers are unwilling to assume obligations so distant.

Scrap scarcity has sent buyers to scouring all districts for material. Prices still are being bid up by hungry buyers, though less feverishly. Heavy steel has been sold at $47, Pittsburgh, and $50 metal seems at hand.

Ship Steel in Controversy

Settlement of the steel prices for the big tonnage for government merchant ships hangs on the outcome of the controversy between Gen. Goethals and Chairman Denman of the shipping board, which fast is reaching the breaking point. The President himself may give the last word. Gen. Goethals tentatively has fixed the price of ship steel at 4.25c, Pittsburgh, for plates, 4c for shapes and 3.75c for bars. The question of cost of production, now the subject of inquiry, will determine the final action. In the meantime, the placing of ship contracts proceeds vigorously. For the 80,000 tons of large rounds for 3-inch shells, 3.75c, Pittsburgh, has been fixed upon by the government as a settling price.

It develops that the 2.90c and the 2.50c prices originally applied to 610,000 tons of plates, shapes and bars for 1917 delivery to the war and navy departments have been extended to embrace an additional tonnage for this year. The various cantonments about to be constructed are calling for a heavy tonnage of various mill products.

Independent makers have continued to lead in further price advances. The week's developments in this line have included $16 to $26 further in standard pipe and $10 in wire products.

THE OPEN HEARTH

Must Pass Webb Export Bill

THE house again has proved its constructive support of the cause of greater and better foreign trade for American manufacturers by passing the Webb bill which legalizes the formation of selling combinations in the export field. This is the second time the house has put itself on record in favoring this all-important business measure. At the last congressional session, the bill, after having received the approval of the house, failed to reach a vote in the senate.

The upper branch of congress should have a chance to put itself on record without delay on this proposal for co-operative business effort. In its way, the Webb bill takes rank with other emergency measures of preparedness which are being hurried onto the statute books. In preparing for war, the country must not forget to make itself ready for after the war. The large corporations who have thoroughly studied and systematized their export business, probably will be able to give a good account of themselves in the post-bellum competition. It is the main body of manufacturing enterprises in this country represented by the smaller and medium sized corporations, however, that the Webb bill is aimed to aid. It represents an enlightened application of effective and unified effort and as such will be of great value to the whole country.

Industry Increases War Partnership

IN THE nation's outgiving of patriotism and of solid support of a righteous war as symbolized by the oversubscription of the Liberty loan, the part that industry has played stands out as a fine and typically American performance. The response of the manufacturing corporations, led by the iron and steel companies in putting their surplus at the disposal of the government has been marked by a spirit of liberality and of positive co-operation. The manner in which their treasures have been opened wide demonstrates the full appreciation of those guiding the policies of these enterprises of the dependence that must be placed by the nation upon these units of business if a successful war is to be waged. It represents the forging of another tie between government and business that should yield richly in dividends of better understanding and of closer effort in future years.

But the part that the individual has contributed to the tremendous success of the loan is of much greater significance and importance to the country at large. No national loan floated in this war has enrolled so many persons as the first American issue. No class of workers in the nation has come forward in such numbers or so freely to give their aid to the common cause as those engaged in industrial pursuits. The percentage of those subscribing to the loan, to total plant forces has been amazingly high, numerous instances on all sides show. The remarkable response in such largely industrial communities as Cleveland, Pittsburgh, and Chicago is impressive of this fact.

Through their financial support of the war, thrift has been stimulated with thousands. A new direct interest in the success of American arms and a stronger national spirit have been stirred. It is not too much to hope and expect that among the beneficial effects of this new relation for many, of lender to country, will be an intensified determination of industry to fill uninterruptedly and well its indispensable role in the great struggle.

Potentialities of Liberty Loan

A TRUE conception of the amount subscribed by patriotic Americans to the Liberty loan can be had by translating its purchasing powers into terms familiar to the iron trade. In 1916, a year of unprecedented prosperity, record-breaking production and historically high prices, the combined market value of iron ore shipped from the Lake Superior regions, beehive oven coke made in the Connellsville district of western Pennsylvania and the output of American blast furnaces was not 50 per cent of the initial contribution of this country to its great cause.

Production of pig iron in this country in 1916 was 39,435,000 tons, which was sold at an average price of not more than $25 a ton, or $985,875,000. The actual average price of steelmaking metal sold by blast furnaces in the Shenango and Mahoning valleys was only $21.50 a ton in the year ending Dec. 31, last. Beehive coke ovens in the Connellsville regions last year produced 21,762,000 tons, which was sold at an average price of about $2.58 a ton, or $56,145,960. Sixty-four million tons of Lake Superior iron ore, the average value of which was about $4 a ton, involving $256,000,000, were moved last year. The combined market value of these three commodities was $1,298,020,960, or less than one-half of the total amount subscribed to furnish means of forestalling the Prussian autocracy in its ambitious purpose to rule the world.

The combined pig iron producing capacity of the allied powers, including the United States, Great Britain, France, Russia, Italy and Japan, estimated at 54,429,089 tons per annum, would command $1,360,727,225, on a $25 market, or $62,706,265 more than the market value of Lake Superior iron ore, pig iron and Connellsville coke produced in the United

THE OPEN HEARTH

States last year; but considerably less than the bond subscriptions in the New York, Chicago and Cleveland districts alone, which aggregated more than $1,636,000,000. Going a step farther, the annual production of pig iron in countries now at war would not command $2,000,000,000, if sold at $25 per ton.

Available figures show that Germany is producing about 13,190,172 tons of pig iron per year. The annual output of furnaces in Germany would have to be sold at slightly more than $150 per ton to raise the amount involved in the Liberty loan. Total pig iron production of the central powers, including the output of blast furnaces in Germany, Austria-Hungary and many stacks in occupied section of France and Belgium, is estimated at 20,940,172 tons per annum, considerably less than the tonnage produced in this country in any year since 1909. At $25 per ton, the value of metal produced by the central powers last year was $523,504,300.

Men and women identified with the iron, steel, machinery and allied trades, the potentialities of which may be the deciding factor in the struggle for democracy, are to be congratulated for the generous manner in which they aided the nation in its momentous undertaking. The names of virtually every blast furnace, steel works, foundry and machine shop in the country already have been written upon the roll of honor.

One Way to Lessen Traffic Problem

DESPITE the serious troubles experienced by manufacturers during the past winter in obtaining pig iron, coal, and other raw materials, sufficient preparations are not being made in providing for the coming winter. Indications now point to even greater car, labor and material shortages at that time than anything experienced in the past.

The output of bituminous coal is regulated by the demand. According to the figures of the United States geological survey, 442,000,000 tons were mined in 1915 in this country, and 509,000,000 tons in 1916. The inadequacy of transportation facilities, chiefly, combined with the scarcity of labor in 1916 prevented the output from passing the mark it reached. The producers of bituminous coal have no storage facilities. The coal must, therefore, be marketed as soon as it is mined. It is mined only as there is demand for it and as facilities are available for transporting it to the market.

It is practically impossible for the operators to build during the present summer months storage capacity for accumulating a sufficient amount of coal to have any material effect on the situation for the coming year. Therefore there is only one alternative—consumers of coal must store up supplies during the warm months when the burden on both mines and railroads is comparatively light. Should one-half of the users of steam and gas coal have in their storage piles by Nov. 1, sufficient coal to last them three months, a big load will be taken off the railroads next winter. The railroads themselves, the largest consumers of coal, have always had several hundred thousand tons of coal in their storage piles at the beginning of previous winters; this year they will have several million tons.

It is not only the manufacturer's private interests which should prompt him to take this step; it is his duty. The gigantic necessities of this nation at war are affecting the humblest of manufacturers. The consequential demand for transportation facilities will result in a maelstrom of disorder in later months if part of the inevitable demands on the railroads, such as transportation of coal, is not taken care of at the present time.

Present Prices Not Factitious

CRITICISM of steelmakers by uninformed persons because of present high prices is beginning to appear. On the surface, to those without information as to real factors entering into the market, it seems that the present level of prices has been attained by sellers holding back their product and demanding high prices.

As a matter of fact while the market under present circumstances should be a sellers' market, consumers have been the real cause of the great advance. Larger steel companies sold freely until loaded up to a degree that pushed deliveries further into the future than ever before in the history of the industry. When near deliveries became almost impossible to obtain, bidding began and the buyer really made the price by offering premiums for material.

With finished steel quoted at unusual levels the superficial observer is led to believe these prices are being received on material now being delivered. On the contrary the greater portion of tonnage now being invoiced by mills is at prices many dollars per ton lower than ruling quotations. The buyer who has entered the market late and has obtained a small tonnage pays present prices, but the consumer who contracted months ago in the regular course of his business is paying much less than these figures.

With these facts in mind, the situation becomes clearer and the high prices appear in no way to cast discredit on the maker of steel. Present quotations truthfully reflect the relative forces of supply and demand.

Iron and Steel Prices

Corrected to Wednesday Noon

SCRAP, WAREHOUSE AND IRON ORE PRICES ON PAGE 1374

PIG IRON

(Delivery this year.)

Bessemer valley	$55.00
Bessemer, Pittsburgh	55.95
Basic, Pittsburgh	50.95 to 52.95
Basic, eastern Pa.	47.00 to 49.00
Basic, Buffalo	48.00 to 50.00
Malleable, Pittsburgh	53.95 to 55.95
Malleable foundry, Chicago	50.00 to 51.00
Malleable foundry, Phila.	47.50 to 49.50
Malleable foundry, Buffalo	48.00 to 50.00
No. 1X foundry, Phila.	49.50 to 50.00
No. 2 foundry, Pittsburgh	53.95 to 55.95
No. 2 foundry, Cleveland	53.00 to 54.00
No. 2 foundry, Ironton	50.00 to 52.00
No. 1 foundry, Chicago	52.00 to 53.00
No. 2 foundry, Chicago	52.00
No. 2X foundry, Phila.	48.50 to 49.50
No. 2X foundry, N. J. tide	48.75 to 49.75
No. 2X foundry, Buffalo	47.00 to 50.00
No. 2 plain, Philadelphia	47.25 to 48.25
No. 2 plain, N. J. tide	47.25 to 48.25
No. 2 plain, Buffalo	46.00 to 47.00
No. 2 southern, Birmingham	43.00 to 45.00
No. 2 southern, Cincinnati	45.90 to 47.90
No. 2 southern, Chicago	44.00 to 46.00
No. 2 southern, Phila. del.	43.50 to 45.50
No. 2 southern, Cleveland	47.00 to 48.00
No. 2 southern, N. Y.	43.25 to 45.25
No. 2 southern, Boston	43.50 to 45.50
No. 2 south. interior, N. E.	44.00 to 46.00
No. 2 southern, St. Louis	43.40 to 45.40
Virginia No. 2X, furnace	45.00 to 47.00
Virginia No. 2X, Phila.	47.75 to 49.75
Virginia, No. 2X, Jersey City	48.00 to 50.00
Virginia, No. 2X, Boston	48.25 to 50.25
Gray forge, eastern Pa.	42.00 to 44.00
Gray forge, Pittsburgh	51.95
Gray forge, Birmingham	38.00
Silveries 8 per cent, furnace	60.00
Silveries, 8 per cent, Chicago	53.00 to 54.00
Low phos. standard, Phila.	92.00 to 93.00
Low phos. Lebanon, furnace	80.00 to 85.00
Low phos., Pittsburgh	81.00 to 83.00
Charcoal, Superior, Chicago	49.25 to 51.75
Charcoal, Superior, Buffalo	52.00 to 53.50
Charcoal, Birmingham	45.00 to 50.00

COKE

(At the ovens.)

Connellsville furnace	$11.50 to 12.00
Connellsville furnace, contract	8.50 to 9.00
Connellsville foundry, contract	12.00 to 12.50
Connellsville foundry	12.00 to 12.50
Wise county furnace, contract	7.00 to 9.00
Wise county foundry, contract	8.00 to 10.00
Pocahontas furnace, contract.	7.00 to 9.00
New River foundry, contract.	10.50 to 11.00
New River furnace, contract.	7.50 to 10.00

FERRO ALLOYS

Ferro manganese, prompt	$400 to 450
Ferro manganese, last half.	375.00 to 425.00
Spiegeleisen, 20 per cent furnace remainder of year	80.00 to 85.00
Ferrosilicon, 50 per cent, Pitts.	250 to 260
Ferrosilicon, 50 per cent, Pitts., 1st quarter	150.00
Bessemer ferrosilicon, 9 per cent.	$89.00
Bessemer ferrosilicon, 10 per cent.	90.00
Bessemer ferrosilicon, 11 per cent.	92.50
Bessemer ferrosilicon, 12 per cent.	95.00
Bessemer ferrosilicon, 13 per cent.	100.00

Ferrosilicon prices at Ashland, Ky., Jackson and New Straitsville, O., furnaces.

SEMI-FINISHED MATERIAL

BILLETS

Open hearth, Pittsburgh	$95.00 to 100.00
Open hearth, Philadelphia	90.00 to 110.00
Open hearth, Youngstown	95.00 to 100.00
Bessemer, Pittsburgh	95.00 to 100.00
Bessemer, Youngstown	95.00 to 100.00
Forging, Pittsburgh	115.00
Forging, Philadelphia	115.00 to 125.00
Forging, Chicago	100.00

SHEET BARS

Open hearth, Pittsburgh	$100.00 to 110.00
Open hearth, Youngstown	100.00 to 110.00
Open hearth, Cleveland	110.00
Bessemer, Pittsburgh	100.00 to 110.00
Bessemer, Youngstown	100.00 to 110.00

WIRE RODS, MUCK BAR SKELP

Wire rods, Pittsburgh	$95.00 to 100.00
Muck bar, Pittsburgh	80.00
Grooved skelp, Pitts., nom.	4.00c to 4.50c
Sheared skelp, Pitts., nom.	4.50c to 5.00c

SHAPES, PLATES AND BARS

Structural shapes, Pitts.	4.00c to 5.00c
Structural shapes, Phila.	4.409c to 4.659c
Structural shapes, N. Y.	4.419c to 4.669c
Structural shapes, Chicago.	4.69c to 5.44c
Tank plates, Chicago	8.00c to 9.00c
Tank plates, Pitts. (con.).	4.50c to 5.50c
Tank plates, Pittsburgh	8.00c to 10.00c
Tank plates, Philadelphia.	8.159c to 10.159c
Tank plates, New York	8.169c to 10.169c
Bars, soft steel, Chicago	4.75c to 5.00c
Bars, soft steel, Pittsburgh	3.75c to 4.25c
Bars, soft steel, New York	4.169c to 4.419c
Bars, soft steel, Phila.	4.159c to 4.409c
Cotton ties, Pitts., June	$2.10
Bar iron, Chicago	4.00c to 4.25c
Bar iron, Philadelphia	4.159c
Bar iron, Cleveland	3.50c
Bar iron, New York	4.169c
Bar iron, Pittsburgh	4.75c
Hard steel bars, Chicago.	4.00c to 4.25c

RAILS, TRACK MATERIAL

Angle bars, Pittsburgh, base	3.25c to 3.75c
Angle bars, Chicago, base	3.25c
Standard bessemer rails, mill.	$38.00
Stand. open hearth rails, mill	40.00
Light rails, 25 to 45 lbs., Chic.	60.00
Light rails, 25 to 45 lbs., Pitts.	60.00 to 70.00
Relayers, standard, mill	38.00 to 40.00
Relayers, light, Chicago	40.00
Relaying rails, light, St. L.	58.00 to 60.00
Spikes, railroad, Pittsburgh.	4.25c to 4.50c
Spikes, railroad, Chicago	4.00c to 4.15c
Track bolts, Pittsburgh	5.50c to 8.00c
Track bolts, Chicago	5.00c to 5.15c
Tie plates, Chicago	$60.00 to 65.00

WIRE PRODUCTS

(To jobbers; retailers 5 cents more.)

Wire nails, Pittsburgh	$3.50 to 4.00
Coated nails, Pittsburgh	3.50 to 4.00
Plain wire, Pittsburgh	3.45 to 3.95
Galvanized wire, Pittsburgh	4.15 to 4.65
Polished staples, Pittsburgh	3.65 to 4.15
Galvanized staples, Pittsburgh.	4.35 to 4.85
Barb wire, painted, Pittsburgh.	3.65 to 4.15
Barb wire, galvanized, Pitts.	4.35 to 4.85
Cut nails, Pittsburgh	4.25c to 4.50c

CHAIN, PILING, STRIP STEEL

Chain, ⅜ in. proof coil, Pitts.	7.50c
Sheet piling, base, Pittsburgh	3.50c to 4.00c

Cold rolled strip steel, hard coils, 1½ inches and wider by 0.100 inch and heavier, base per 100 pounds, 8.50c.

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SHEETS

(In cents per pound.)

SHEET MILL BLACK.

No. 28, open hearth, Pitts.	8.00c to 9.00c
No. 28, bessemer, Pitts.	7.90c to 8.90c
No. 28, open hearth, Chgo.	7.69c to 8.19c

TIN MILL, BLACK

No. 28, open hearth, Pitts.	8.00c to 9.00c
No. 28, bessemer, Pitts.	7.90c to 8.90c

GALVANIZED

No. 28, open hearth, Pitts.	10.00c to 10.75c
No. 28, bessemer, Pitts.	9.90c to 10.65c
No. 28, open hearth, Chgo.	9.69c to 10.19c

BLUE ANNEALED

No. 10, open hearth, Pitts.	7.50c to 8.50c
No. 10, bessemer, Pitts.	7.40c to 8.40c
No. 10, open hearth, Chgo.	7.19c to 7.69c
No. 10, open hearth, Phila	8.159c

TIN PLATE

(Per 100 lb. box.)

Tin plate, coke base, nom.	10.00c to 10.50c

IRON AND STEEL PIPE

(Prices adopted May 1, 1917.)

Steel

Diameter in inches.	Black. Per cent off.	Galv. Per cent off.
⅛ to 3, butt	49	35½

Iron.

(Prices adopted May 1, 1917.)

Diameter in inches.	Black. Per cent off.	Galv. Per cent off.
⅛ to 1½, butt	38	22

BOILER TUBES

(Price adopted April 2, 1917.)

Steel, 3½ to 4½ inches, l. c. l.	34
Iron, 3½ to 4½ inches, l. c. l.	28

CAST IRON WATER PIPE

(Class B Pipe.)

Four-inch, Chicago	$63.50
Six-inch and over, Chicago	60.50
Four-inch, New York	63.50
Six-inch and over, New York	60.50
Four-inch, Birmingham	58.00
Six-in. and over, Birmingham	55.00

Class A pipe is $1 higher than Class B.

HOOPS, BANDS, SHAFTING

Hoops, Pittsburgh	6.00c to 6.25c
Bands, Pittsburgh	5.75c to 6.00c
Shafting, Pittsburgh, carloads	5 off to list

RIVETS

Structural rivets, Pittsburgh.	5.25c
Boiler rivets, Pittsburgh	5.35c
Tinner's rivets, Pittsburgh	40 off

NUTS AND BOLTS

(Delivered within 20-cent freight radius.)

CARRIAGE BOLTS

(⅜ x 6 inches, smaller and shorter.)

Rolled thread	40
Cut thread	35 and 2½
Larger or longer	25

MACHINE BOLTS

(⅜ x 4 inches, hot pressed nuts.)

Rolled thread	40 and 10
Cut thread	40
Larger and longer	30
Cold pressed, semi-finished, hexagon nuts	50 and 10
Gimlet and cone point lag bolts	45

NUTS

Hot pressed, square, blank	$2.10 off
Hot pressed, square, tapped	1.90 off
Cold pressed, square, blank	1.70 off
Cold pressed, square, tapped	1.50 off
Hot pressed, hexagon, blank	1.60 off
Hot pressed, hexagon, tapped	1.40 off
Cold pressed, hexagon, blank	1.60 off
Cold pressed, hexagon, tapped	1.40 off

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago.)

Quotations on leading products June 20, average for May, 1917, average for March, 1917, and average for June, 1916. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices June 20, 1917.	Average prices May, 1917.	March, 1917.	June, 1916.
Bessemer pig iron, Pittsburgh..	$55.95	$44.95	$37.45	$21.95
Basic pig iron, Pittsburgh.....	50.95	42.15	32.85	18.95
No. 2 Foundry pig iron, Pitts..	53.95	43.55	36.50	19.50
No. 2 Foundry pig iron, Chgo..	52.00	43.25	35.75	19.00
Lake Superior Charcoal, Chicago	59.50	49.25	37.50	19.75
Malleable, Chicago	52.00	43.25	35.75	19.50
Southern No. 2, Birmingham...	44.00	35.75	24.50	15.00
Southern Ohio No. 2, Ironton..	52.00	38.60	33.00	18.50
Basic, eastern Pa.....	49.00	40.75	34.50	19.25
No. 2X, Virginia, furnace.....	48.00	41.00	34.00	18.00
No. 2X foundry, Philadelphia...	49.50	43.25	37.25	20.00
Ferro mang., delivered.....	425.00	425.00	275.00	175.00
Bessemer billets, Pittsburgh....	95.00	85.00	67.00	41.25
Bessemer sheet bars, Pittsburgh	95.00	88.00	67.00	41.25
Open hearth sheet bars, Pitts..	100.00	88.00	67.00	41.25
Open hearth billets, Pittsburgh.	100.00	85.00	67.00	41.25
Steel bars, Pittsburgh.....	3.75	3.50	3.21	2.50
Steel bars, Chicago.....	4.44	3.84	3.40*	2.69
Iron bars, Philadelphia.....	4.159	4.109	3.309	2.559
Iron bars, Cleveland, local del'y	4.25	3.25	3.00	2.40

*Seaboard.

	Prices June 20, 1917.	Average prices May, 1917.	March, 1917.	June, 1916.
Iron bars, Chicago mill.....	$4.00	$3.89	$3.00	$2.35
Beams, Chicago	5.44	4.34	3.65	2.69
Beams, Pittsburgh contract.....	4.00	4.00	3.46	2.50
Beams, Philadelphia	4.659	4.659	3.759	2.659
Tank plates, Pittsburgh.....	8.00	4.50	4.20	2.75
Tank plates, Chicago.....	7.69	5.49	4.59	3.09
Tank plates, Philadelphia.....	10.159	7.559	5.659	3.909
Sheets, blk., No. 28, Pittsburgh	8.00	7.00	5.05	2.92
Sheets, blue anld., No. 10, Pitts.	7.50	6.65	4.70	3.10
Sheets, galv., No. 28, Pittsburgh	10.00	8.82	6.72	4.79
Wire nails, Pittsburgh.....	3.50	3.50	3.16	2.50
Connellsville fur. coke, contr...	8.50	8.00	7.60	3.60
Connellsville fdy. coke, contr...	9.50	8.50	6.90	3.50
Heavy melting steel, Pittsburgh	44.00	28.40	23.50	16.25
Heavy melting steel, eastern Pa.	34.00	26.00	23.75	15.75
Heavy melting steel, Chicago...	40.00	28.75	23.00	15.25
No. 1 wrought eastern Pa.....	48.00	40.75	30.50	20.75
No. 1 wrought, Chicago.....	45.00	32.50	25.75	15.25
Rerolling rails, Chicago.....	47.00	36.75	27.25	16.25
Car wheels, Chicago.....	38.00	27.25	20.25	12.50

(For Additional Prices See Pages 1322 and 1374)

Flight of Pig Iron Prices Unchecked

Fifty Dollar Quotations Now Prevail on All Northern Brands—Basic Sells at $52, Foundry and Malleable at $55—Alabama at $42 to $44 —Inquiry For Last Half of 1918

Cleveland, June 19.—Consumers finding many of the furnaces surprisingly booked up to July 1 are being influenced to further extend their forward buying and various inquiries for delivery during the third and fourth quarters of 1918, or 15 to 18 months distant, are now appearing. Makers have refused to quote on these, holding July 1 of next year as the limit of sales. A number of the lake furnaces are theoretically sold out to midyear of 1918 with from only 2 to 4 per cent of expected output unbooked. Miscellaneous inquiry has been active most of the week, but has tapered off during the past day or two. Supplies are scarce and prices still are rising. One producer has sold 5000 tons of first quarter bessemer at $55, valley. One maker with little to offer, wants $55, furnace, for foundry and malleable for this year and $53 for first half. The minimum appears to be $53, valley, at which various sales were made. One 1000-ton lot of first quarter malleable brought $53, valley. Local buyers closed for 250 tons of Ohio silveries for first half at $70, furnace, or about $71.60, delivered, and are buying more at this figure. The Westinghouse Electric & Mfg. Co. has closed for 10,000 to 12,000 tons of foundry for first half delivery at Cleveland. It is understood this was done on an old quotation.

Sales of southern iron for the third quarter of 1917 were made at $44, Birmingham, or $48, delivered. Two of these sales were for 300 and 500 tons respectively. First quarter, 1918, prices range around $46, delivered, or $42, Birmingham. Recent sales at this figure were for 900 tons, 500 tons and 1000 tons.

$50 Becomes Eastern Minimum

New York, June 19.—While demand for pig iron in this district during the last week has been of smaller proportions than for some time past, developments in prices have been sensational. No. 2X foundry was sold during the week at $46 to $50, furnace, for this year, and at $46 to $48 for first half, but asking prices lower than $50, eastern Pennsylvania, for any shipment, have faded away. Central Pennsylvania No. 2X already has been sold in small lots at $52. The lowest now heard on any central Pennsylvania iron is $49, for any shipment. Buffalo prices also reflect the advance and one Buffalo maker who recently was selling at $46 to $48, furnace, for this year and $44 for next, now has a minimum of $50 for any position. The new price has been done on considerable foundry business for this year, but no $50 sales for first half yet are reported. Considerable low phosphorus, basic and bessemer have been sold in this district during the week. A Pennsylvania maker sold 1000 tons of June-July bessemer to an eastern consumer at $52, furnace. A resale lot of 2000 tons of bessemer went at the equivalent of $54, valley. Several other lots of bessemer were disposed of and the price rapidly is tending toward $55. Copper-bearing low phosphorus iron was sold at $80 and $82.50, eastern Pennsylvania furnace. A New York state maker sold 3000 tons of standard low phosphorus at $80, furnace, but nothing like this price now could be done. Sales of basic during the week included one of 2000 tons for export to Japan. An inquiry recently was issued here for 20,000 tons of basic for December and first quarter shipment to a plant

outside this district. A Perth Amboy, N. J., steelmaker is out for 5000 tons of basic for first half. Among current inquiries for foundry iron is one for 2000 tons for first half shipment to a nearby consumer. A Rhode Island user wants 2000 tons of malleable for next year, 1000 tons of which is for delivery after July.

Market Quieter But Higher

Philadelphia, June 18.—Eastern Pennsylvania pig-iron makers, one by one, have been advancing No. 2X foundry to the $50 mark and apparently asking prices in no case now are lower than this figure, both for this and next year. The new level so far has been done only on a few comparatively small prompt lots. Furnaces generally are not anxious to take any further business, due not only to the extent to which they already are sold ahead, but to the uncertainty of future costs. Most of the business in foundry iron of the comparatively quiet week went at lower prices. Lots ranging from several hundred to 1000 tons each were closed at $47 to $50, furnace, for this year, and at $46 to $47 for first half. Although $45, furnace, for Virginia No. 2X for this year still figures in the market, a round tonnage has been sold at $48 and at least two makers are quoting $50, furnace, as a minimum on No. 2X and more for higher silicon. One Virginia maker now is quoting $52 for No. 1X for the next three months. Minimum on central Pennsylvania foundry, both for this and next year, now appears to be $48, furnace, with one maker quoting $49.50 and two others $50. Considerable gray forge was sold for this year at $44 to $46, furnace. A large amount of inquiry for standard low phosphorus iron for this year remains unsatisfied. The week, however, has brought out very heavy sales of this grade for first half at big advances over previous prices. Several thousand tons of basic have been sold at $47 to $49, and it is unlikely that less than $50 now can be done. Quotations on Lebanon low phosphorus during the week have ranged between $80 and $85, furnace, but no sales are reported. Several round tonnages of standard bessemer have been sold at $50 to $52, furnace. Asking prices now are considerably in advance of these figures.

Prices Still Higher in Valleys

Pittsburgh, June 19.—More than 100,000 tons of pig iron were involved in sales the first two weeks of this month. Virtually every steel works and foundry interest figured in the market for delivery the second half of this or the first half of next year. The general market has been comparatively quiet this week. The tendency of prices continues upward. Scattering lots of basic iron, involving about 12,000 tons in the aggregate, have been sold at $50 to $52, valley. On an inquiry for 5000 tons of bessemer for export, a valley merchant just quoted $57, furnace, but none of this metal has been sold to the domestic trade at more than $55. For delivery this year, foundry and malleable irons have commanded $55 and no tonnage is being offered at less than $53, valley, for 1917 shipment. The Westinghouse Electric & Mfg. Co. is credited with having taken about 10,000 tons of foundry for its works at Cleveland for delivery the first six months of next year.

$3 Advance at Buffalo

Buffalo, June 19.—Iron prices in the Buffalo district continue to advance and the level now is $3 above the quotations of a week ago. The demand keeps up actively. With scarcely any iron, irrespective of grade, obtainable from Buffalo furnaces for any delivery, the sales of the week have amounted to less than 10,000 tons. A leading purchaser of this section is predicting that further advances are to be expected, and in the event of the settlement of the war, states the demand for merchant iron will become such that a level of $75 per ton is apt to prevail over an extended period. This same buyer predicted $50 iron when it was selling below $20. The range on high silicon irons now is up to $52 to $53 and No. 1 foundry is being held at $51 to $53. The range on No. 2X foundry is firmly established at $50 to $53 with the same prices being asked for malleable and basic. The lower grades of foundry iron are holding at a minimum of $49 and $55 to $60, Buffalo, is being secured for Lake Superior charcoal.

High Silicon at Lofty Point

Cincinnati, June 18.—Both silvery iron and bessemer ferrosilicon are in great demand and have jumped abruptly in price. For first half some 8 per cent Ohio silvery has recently brought $60 and $70, furnace. Bessemer 10 per cent ferrosilicon has been sold as high as $90, furnace. None of the high silicon irons can be had for this year, and as a consequence no prices can be named. Southern iron has advanced to an unheard-of figure, and for prompt shipment nothing below $45, Birmingham has been quoted, with no sales reported at this price. A fairly nominal quotation for this year would be $43 and for the first half of next year from $41 to $42. A northern Ohio user bought a few hundred tons of southern foundry at a reported figure of $41 for first half. Northern foundry iron for prompt shipment has practically disappeared. Ironton furnaces are making a nominal quotation of $55, furnace, but can only take on a very little more tonnage. For next year around $51 to $53 is named. There is an unauthenticated rumor in circulation that $50 would be accepted on desirable business. This would apply only on foundry, as there is such a call for basic from all over the country that furnacemen can practically name their own prices. There is a fairly large general inquiry for foundry also. Quite a number of sales from 200 to 500 tons of southern have been made for first half. Lake Superior charcoal is scarce and little can be had for this year at any price.

Covering for 1918 Needs

St. Louis, June 19.—Aside from sales of fairly liberal tonnages for 1918 delivery the market for pig iron here has developed no new features during the past week. The situation, however, continues extremely tense, with consumers of all classes making strenuous efforts to secure supplies, and dealers frankly admitting they are at the end of their resources. Producers are not encouraging future buying, and solicitation for 1918 is entirely absent. One leading firm reported the sale of 2000 tons of Superior charcoal iron at $53, furnace. No. 2 southern foundry iron is quoted nominally at $43.40 to $45.40, f. o. b. St. Louis or East St. Louis, for delivery this year. While dealers quote this range, they admit it would be impossible to secure any considerable tonnages even at the major figure. Cars are difficult to get. Many furnaces are sold up and out of the market.

Southern Iron Grows Scarcer

Birmingham, Ala., June 19.—Growing scarcity, further advance in prices and great effort necessary to get delivery, tell the story of the week in southern pig iron. Quotations have gone to $41 per ton for No. 2 for the first half of next year and $42 is being asked for this year. Very little iron is available for this year. Special brand and special analysis irons are being inquired for and a few sales, in small lots, have been made at from $42 to $42.50. One or two brokers have been offering iron at around $45 but no sales have been made as yet at that price. Three or four makers in the Birmingham district reiterate the statement that they

are out of the market and are only caring for regular customers and then in very small lots. One of the leading producers sent notice to agents and brokers during the week that first half business would be accepted only at $41 for No. 2. Charcoal iron holds strongly at $50.

Chicago Iron Now $52

Chicago, June 19.—Chicago furnaces are quoting $52, furnace, on No. 2 foundry, malleable and basic iron for prompt delivery, last half of this year and first half of 1918. The quotation of $50 held until near the close of last week with inquiry fairly steady and frequent sales. At the close of the week $1 had been added and the present week opened with a second $1 tacked on. Inquiry is fair and stronger than had been expected after heavy sales. Present sales are not large, but are sufficient to raise the range of prices. Malleable users are seeking additional iron, especially for first half. The National Stamping & Enameling Co., Granite City and East St. Louis, is inquiring for 20,000 tons of basic for December and first quarter of 1918. This buying is done through its purchasing agent in the east and it is not known here whether the business has been placed. Southern iron appears to be selling at $45, Birmingham, for prompt or last half of 1917. For first half of 1918, the minimum quotation seems to be $42, Birmingham. Last week it was possible to place some tonnage at $40, Birmingham, but this apparently has disappeared. Lake Superior charcoal iron is now quoted by a leading maker at $59.50 to $62, delivered, Chicago. A quotation of $57 to $59.50 late last week has been withdrawn. High silicon iron was quoted recently by a southern maker at $57.75, delivered, Chicago, for 8 per cent.

Institute Opens Office

The Eastern Bar Iron Institute, which recently was organized by eastern bar iron producers to operate on the Eddy system of open market price competition, has opened an office at 103 Park avenue, New York, in charge of Albert C. Taylor. The officers of the institute are: President, E. M. Zehnder, Scranton Bolt & Nut Co., Scranton, Pa.; vice president, Frank C. Kennedy Jr., Logan Iron & Steel Co., Philadelphia; treasurer, Edward Edwards, Columbia, Pa. Mr. Taylor is secretary. The institute is to hold meetings at regular intervals in New York and other eastern cities.

George B. DeArment, president of the Champion Tool Co., Meadville, Pa., died May 20, aged 64 years.

Ferro Prices Show Spread

Next Year's Sales Closed at $375—Early Metal Firm—Bessemer Ferrosilicon Up to $90, Furnace

New York, June 19.—Prices on domestic ferromanganese again show considerable variation. One of the principal sales of the week involved several hundred tons for first half to a Wheeling consumer at $375, delivered. Other first half sales were made at this figure, and it is reported that even lower was done. On this year's shipment, nothing less than $400 is heard and asking prices range from this figure to $450. Additional small prompt tonnages have been sold at around $450. Inquiry is of fair proportions, although no especially large tonages are involved. No English ferromanganese has been offered for some time. The steamer SOUTHLAND, recently sunk by a submarine, had 1000 tons aboard, so that June arrivals probably will not be much over 3000 tons. Several lots of Indian manganese ore, totaling approximately 2000 tons, have arrived or are due at New York.

Spiegeleisen for prompt shipment has been sold in carload lots during the week at prices ranging from $82 to $87.50, furnace. Numerous lots for this year, involving around 100 tons each, have gone at $80 to $85.

Fifty per cent ferrosilicon for shipment over the first half has been offered here during the past week at $130, delivered. Sales of carload lots for June and July have been made at $250 and at least one car went at slightly over $240. Inquiry is active for this year and the early part of next. Several inquiries from abroad are current, one for 500 tons. Jackson county, O., 11 per cent bessemer ferrosilicon has been sold to eastern consumers during the week at $85, furnace, for prompt shipment. As high as $90 has been paid for 10 per cent. The Bethlehem Steel Co. is in the market for 500 tons of 11 per cent.

Sales of 70 per cent ferrotungsten in small tonnages for early shipment have been made during the week at as high as $2.30. The general market now may be quoted at $2.10 to $2.30, depending on quantity. Ferrochromium, 60 to 70 per cent, containing 4 to 6 per cent carbon, continues to be quoted at 21c to 25c, for moderate-sized quantities for prompt, while for future delivery, not much below 18c to 20c can be done.

Ferro Shows Wide Range

Pittsburgh, June 19.—Dealers in ferromanganese are quoting from $400 to $425 for delivery this year, and $375 for shipment in the first quarter of 1918. On account of uncertainties caused by the war, the market likely will continue irregular for an indefinite period. Fifty per cent ferrosilicon is quoted at $130 to $150 for nearby, and $250 for first half shipment. Sellers of lower grades of bessemer ferrosilicon had no difficulty in establishing prices adopted a week ago, when quotations were boosted $15 a ton.

Ferro Holds Strongly

Chicago, June 19.—Ferromanganese from the local maker is quoted at $450 for any delivery the present year. Sales constantly are reducing the available production and it is difficult to place contracts. Spiegeleisen is fairly scarce and is quoted at $80 to $85 per ton, eastern furnace, for 20 per cent.

Sheets Advance

Warehouse Prices Show Substantial Increase

Chicago, June 18.—Chicago warehouses have advanced No. 10 gage blue annealed and No. 28 gage black sheets from 8.50c to 9c and No. 28 gage galvanized sheets from 10c to 11c. Plates, shapes and bars, as well as bar iron, remain unchanged.

Stocks Are Diminishing

Buffalo, June 19.—Warehouse interests report that available supplies are being rapidly diminished resulting in the leading seller quoting 4.60c on bars, 5.10c on structural shapes and 7.10c on plates. Other warehouse interests are quoting higher prices on plates and about the same level as the leading interest on bars and shapes.

Further Sheet Advances

Detroit, June 19.—Some further advances in warehouse prices in this district have been made. No. 10 blue annealed sheets now are listed at 9c; No. 28 black, at 9c; hoops at 6.50c.

Blows in Stack

The Donner Steel Co., on June 11, blew in its No. 2 furnace on foundry iron. The capacity of this stack has been increased from 250 to 300 tons daily.

Shell Bar Price is Fixed

Rounds For 9,000,000 Shrapnel Forgings Will Be Placed at 3.75c, Pittsburgh—Bar Iron and Rivets Up

New York, June 19.—Quick delivery is to be made of the 80,000 tons of steel rounds entering into the production of the 9,000,000 rounds of 3-inch shell forgings and shrapnel case forgings recently ordered by the war department. The price of 3.75c, Pittsburgh, per pound fixed for the steel is to apply to that particular order only, indications being that higher levels will be obtained for future requirements of bar stock. The steel is to be distributed through the committee of the American Iron and Steel Institute on steel and steel products.

Hold Bars at 4.50c

Philadelphia, June 18.—Soft steel bars now are held generally in this district at 4.50c, Pittsburgh. Several round tonnages offered at less were refused by the mills. Considerable third quarter contract business has been taken at 4.50c. Numerous small tonnages have gone as high as 5c, and one mill is selling small lots from stock, as high as 6c. Bars rolled from shell discards are at a minimum of 4c, Pittsburgh. A leading eastern maker has advanced refined iron bars to 4.25c, Pittsburgh, staybolt iron to 5.25c, chain and engine bolt iron to 4.40c, and double refined to 4.65c. In general, the bar iron market for prompt and third quarter shipment may be quoted at 4c, Pittsburgh, and some business last week went as low as 3.75c. Demand for all kinds of spikes has been of exceptional proportions, particularly in boat spikes, stocks of which have been almost completely wiped out as a result of the huge demand from shipyards. Boat spikes now are quoted at 5.25c, base, mill.

Bar Situation Complicated

Pittsburgh, June 19.—Formal quotations of subsidiary companies of the United States Steel Corporation on such standard commodities as plates, shapes and bars no longer appear to represent the market, even for delivery at the convenience of the mill. The Carnegie Steel Co. continues to quote steel bars at 3.50c, but has restricted its operations as an active market factor, having scarcely any tonnage available for shipment before Jan. 1 next. Many consumers recently have paid 3.75c for their bar steel requirements the second half of this year; sales, however, are being made at as high as 4.25c for extended delivery. The market, based upon actual sales, is quotable at 3.75c to 4.25c. Manufacturers of bar iron have advanced prices $10 a ton to 4.75c.

Hard Bars Hold Firmly

Chicago, June 18.—Hard steel bars continue at 4c, Chicago mill, with general manufacturers asking the most tonnage. Bars for concrete reinforcement are in light demand, a fact welcomed by makers under present circumstances. An inquiry was received last week for 300 tons of hard bars for building double-deck army cots for camp use. Local mills were unable to take on this business.

Shape Shortage Boosts Bars

Cleveland, June 19.—The demand for reinforcing bars for construction purposes has been broadened by the inability of builders to get structural steel. For enlargements of the plant of the Firestone Tire & Rubber Co., Akron, 1000 tons have been placed by the Hunkin-Conkey Construction Co., the general contractors, and 1000 tons still are pending. An inquiry for 1300 tons for Norfolk dock construction has been put out by the Cleveland Dock & Engineering Co. Various small orders are being placed. Some makers now are quoting 3.75c, mill. Scarcity and high prices of rerolling rails are the important factors. Cold rolled steel is scarce and some leading makers are out of the market completely.

Independents Are Withdrawing

Buffalo, June 19. — Independents through their selling agencies are withdrawing from the market owing to the scarcity of steel even for advanced deliveries. Such producers as remain in the market are quoting 4c to 4.50c.

Soft Steel Bars Scarce

Chicago, June 18.—Practically no buying of soft steel bars is being done in this territory. With the two leading makers entirely out of the market, little opportunity is left for placing any business. Some selling has been done by an eastern maker but only certain sizes can be taken, and on this business about 4.19c, Chicago, is obtained.

An eastern steelmaker quotes 4.44c to 4.69c, Chicago, on soft steel bars and sales have been made at these figures. The minimum quotation applies on attractive sales; the higher on small lots.

Bar Iron Grows Scarce

Chicago, June 18.—Chicago makers of bar iron are selling nothing under 4c, Chicago mill, and 4.10c to 4.25c has been obtained recently on carload sales. Small lots of a carload or a few cars represent about all that can be done in this district. Most mills have their output for three to four months under contract and seek to avoid further obligation. Consumers are specifying their contracts fully and are seeking early deliveries, indicating an actual need for the material.

Negotiating on Rivet Price

Cleveland, June 19.—Manufacturers in this district, it is understood, will share heavily in the distribution of the 40,000 tons of structural rivets for the government ship program. One maker is credited with an allotment of about 10,500 tons and other plants with smaller quantities. The matter has not yet been settled, pending the enactment of the war budget. The price is subject to continued negotiations. A flat price is being talked of for this year, but for delivery after Jan. 1 a conversion arrangement, based on the price of steel is proposed. Not all the local makers have followed the $5 advance in the Pittsburgh district. Some this week were still naming 5c on boiler and 4.90c on structural rivets for third quarter.

Rivets Advanced $5

Pittsburgh, June 19.—In consonance with higher quotations on steel bars, rivetmakers a few days ago advanced prices $5 a ton to 5.25c and 5.35c, respectively, for structural and boiler rivets. Quotations on nuts and bolts have not been changed since April 17 last, but an advance is impending. Demand for nuts, bolts and rivets is exceedingly heavy. Definite orders for the 40,000 tons of ship rivets which manufacturers are being called upon to furnish the government have not been distributed.

Shafting Price Advancing

Pittsburgh, June 19.—The list price is being paid more frequently by consumers of cold-rolled steel shafting, although some tonnage continues to be sold at 5 and even 10 per cent off the list for future delivery. Heavy tonnages are being used for the manufacture of fuses.

Hoops and Bands Strong

Pittsburgh, June 19.—Manufacturers of hoops and bands are having no difficulty selling the former at 6c and the latter at 5.75c as a minimum. One prominent maker is refusing to shade 5.85c for bands.

Munition Steel is Sought

Manufacturers Ask Material For Shell Forgings—Eastern Slabs at New High—Sheet Bars Not Offered

Cleveland, June 19.—A local company is figuring on a government contract for 6000 to 7000 tons of gun forgings and is inquiring provisionally for the semifinished steel that will be needed. The 25,000-ton inquiry for 3¼-inch rounds by the Hydraulic Pressed Steel Co. still is pending.

No Bars For Sale

Youngstown, O., June 19.—No sheet bars are for sale in the open market in the valley and no quotations are offered. The leading producer reports that he is sold out for the third quarter and will not open his books for last quarter before September. This maker declares that if he found himself in position to sell bars for any delivery $105 for bessemer and $110 for open hearth would be asked. Traffic conditions are somewhat improved this week.

Consumers are Under Cover

Pittsburgh, June 19.—Nearly all manufacturers of finished commodities dependent upon the open market for their steel supplies have covered requirements for the third quarter of this year. Several sheet and tin plate makers who only partly covered their needs at $80 to $85, mill, have since bought at $100, mill, for shipment in July and August. Billets are held at $95 to $100 and wire rods are selling at the prices prevailing for billets. Muck bar is held at $80.

Slabs at New High Mark

Philadelphia, June 18.—Sales of round tonnages of open-hearth slabs have been made during the past week at $110, mill, another new high record. Small tonnages of open-hearth forging billets have been sold at $125, and a sale is reported but not confirmed at $130. Numerous other sales of slabs have been made at higher than $100. Wire rods have been offered here at $90, Pittsburgh. Sales of several hundred tons of open-hearth shell discards have been made at $50, Pittsburgh. Export demand for semifinished steel has fallen off noticeably of late, due to the decreased amount of vessel space. In numerous cases vessel space set aside for steel recently has been reassigned to other freight at the last minute. In one case a few days ago space promised for a round tonnage of open-hearth slabs was commandeered for grain. Although unsatisfied foreign requirements continue large, this situation tends to discourage placing of orders.

Strip Steel Rise Imminent

Pittsburgh, June 19.—With manufacturers paying as high as $95 for billets, it is likely that quotations on strip steel will be put up to 9c or 9.50c as a minimum, when books formally are opened for third quarter shipment. Some tonnage has been sold recently at 8.50c, base, for delivery at the convenience of the maker. Automobile manufacturers and builders of adding machines, typewriters and the like are specifying briskly.

L. Brenner & Co., scrap iron dealers, Lebanon, Pa., have purchased four acres in the western part of that city and will establish a second scrap yard.

Year's Plate Books Full

Eastern Makers Able to Handle Few Additional Orders For Month—Contracts at 10c—Cutting Extras Higher

Philadelphia, June 18.—Activity in the plate market in this district during the past week consisted chiefly of the placing of contracts for specification over the third quarter. The tonnage thus secured has been kept down to minimum; for instance, a customer wanting 1000 tons has had to content himself with 400 to 500 tons. Inquiries for many thousands of tons again were turned down; in fact, very little so-called "new business" was accepted. With a few exceptions, which were governed by special considerations, the minimum quotation on tank plates during the week was 10c, Pittsburgh, and in some cases even higher was done. On boat steel the minimum is 12.50c, Pittsburgh. One order for Lloyds boiler steel, for shipment early next year, was taken at 16c, base, mill. One mill is quoting 11.50c to 12c, Pittsburgh, on tank plates for export. The mills report that the output is practically normal, and they have all they can do for a year ahead without booking any additional tonnage. A leading eastern mill has advanced its extras for cutting circles, effective June 1. The new extra is 25 per cent of the base price plus 0.05 to 1.55c, depending on the diameter. The old extra was 0.3c per pound.

Market is Marking Time

Pittsburgh, June 19.—Manufacturers of steel plates manifest considerable interest in the Goethals-Denman controversy over prices at which material will be furnished for the construction of ships under the direction of the emergency fleet corporation. Plates continue to sell at high prices. Prices nominally quoted by subsidiary companies of the United States Steel Corporation no longer are regarded as having any direct bearing upon the general market. Tank plates are being sold from 8c to 10c for delivery at the convenience of the mill and sales at as high as 10.50c and 11c are reported in isolated instances.

Canada Asks Boat Steel

Cleveland, June 19.—An inquiry for 1000 tons each, principally plates, for two boats for Port Arthur, Ont., delivery, has come out. Local buyers have been closing third quarter contracts on the basis of 10c, eastern Pennsylvania mill, for tank plates. Small lots of prompt plates were sold this week at 10.50c, eastern Pennsylvania mill.

Unobtainable at Chicago

Chicago, June 18.—Buying of steel plates has practically ceased. Platemakers in this territory who are sold far ahead have received some government specifications for shipbuilding and expect further tonnage. Under these circumstances, further selling to private consumers is deemed unwise. It has come out that steel plates for shipbuilding have been sold at 4.44c, Chicago mill, or 4.25c, Pittsburgh. These plates are for use in merchant ships to be constructed on the Pacific coast. On recent sales of plates by eastern makers, 7.69c, Chicago, was obtained and offers of 8c to 10c have been made by consumers desirous of obtaining further supply.

Plate Mill Started

Youngstown, June .5—The 72-inch plate mill of the Youngstown Iron & Steel Co. has been placed in commission after a several years' idleness. Its annual capacity is about 65,000 tons. W. H. Eshleman is superintendent.

Sheet War Demand Lively

Miscellaneous Orders Flowing to Mills From Government and Contractors—15,000 Tons Wanted—10 to 20 Per Cent Concession

Youngstown, O., June 19.—Sheet allotments to regular customers are being reduced, new business is being discouraged, and the production of the mills in the valley gradually is being diverted to war purposes. By the time the long-awaited allotments from the sheet committee of the American Iron and Steel Institute are announced, the mills already will be devoted largely to military business. No particularly large single inquiries from government sources have appeared this week, the largest being around 100 tons each, but the aggregate tonnage desired probably runs close to 15,000 tons. All grades are wanted. One inquiry is for 100 tons of galvanized material for shelving and smoke stacks for destroyers. Most of the remainder is for the war department for miscellaneous camp equipment.

Bessemer black sheets, No. 28 gage, are quoted at 8.75c to 9c; blue annealed No. 10 at 8.50c to 8.75c; galvanized No. 28, at 10.25c to 10.75c. Open-hearth material is from $5 to $10 a ton higher. These prices are quoted on odd lots to commercial consumers and on allotments to regular customers. Quotations on government work is around 10 per cent and in some cases in which the inquiry comes directly from the war or navy department, reductions of close to 20 per cent have been made. It is the belief of some in the trade that no large allotments at one time may come from the sheet committee; and that government work will continue to come piecemeal, as it is coming now. It is certain that thousands of tons are not passing through the hands of the committee at all but is coming direct from quartermasters and departmental offices. Traffic conditions here have appreciably improved as far as most of the sheet mills in the Mahoning valley are concerned. Government shipments are given the preference more and more.

Mills Are Swamped

Pittsburgh, June 19.—Sheetmakers, with few exceptions, have withdrawn from the market entirely, making it increasingly difficult to obtain a line on the position of prices. What little tonnage is available for delivery within the next 90 days is being sold at decidedly high prices. Large quantities of material have been purchased by the government, requirements of which are increasing rapidly. Thus far, the bulk of the sheet tonnage has been purchased for the navy. Carbuilders are complaining about deferred deliveries of sheets, claiming they may be embarrassed seriously, unless relieved shortly.

Want Sheets For Camps

Cleveland, June 19.—Sales of No. 10 blue annealed sheets for delivery in two or three weeks were closed in this district this week at 8.75c, Pittsburgh. Requirements for the various cantonments continue to bring inquiries into the market. A northern Ohio manufacturer has soft steel for army ovens. The American Car & Foundry Co. has been one of those inquiring for a round tonnage of blue annealed sheets for camp stoves. This buyer wanted 7500 tons.

Demand Far Exceeds Supply

Buffalo, June 19.—Only very limited quantities are obtainable according to selling interests with a demand far in excess of the available supply. From 8c to 8½c is being quoted on blue annealed and 9c is now the prevailing price on black sheets.

More War Orders Placed

Philadelphia, June 19.—Business in the sheet market in this district during the week included additional small tonnages of blue annealed for government war requirements. These continue to be distributed under the general direction of the sub-committee on sheets and the price represents a concession of approximately 18 to 20 per cent. The general market on blue annealed continues 8c, Pittsburgh, or 8.159c, Philadelphia, for No. 10. This figure largely is nominal since all business other than government requirements is being avoided wherever possible. Small lots for delivery in a few weeks, have been sold at 8.25c, Pittsburgh, and early black sheets at 8.25c, Pittsburgh, for No. 28. Galvanized sheets for quick shipment have been offered at 10.75c, Pittsburgh, for No. 28.

Big Tonnage to be Bid

Chicago, June 19.—Heavy requirements in sheets for army material are impending, supplies have been growing scarcer and virtually no maker now will entertain a contract for the material. Already some small tonnages have been requisitioned for building camp stoves and within a short time the depot quartermaster at Chicago will take bids for additional camp stoves requiring 12,000 to 15,000 tons of blue annealed sheets. Requirements for the construction of ranges and tanks for army posts are expected to follow shortly. For this material it is understood mills will receive about 7c per pound. Recent quotations on No. 28 gage black sheets were 8.69c to 9.19c, Chicago mill. The same quotation applies on No. 10 gage blue annealed and for No. 28 gage galvanized 10.19c to 10.69c has ruled recently.

More Awards

For Steel Ships and Wooden Hulls Announced by Fleet Board

Washington, June 19.—Awards were made during the past week by the emergency fleet corporation of the United States shipping board for 10 steel ships to the Seattle Construction & Dry Dock Co., Seattle, Wash.; for 10 wooden hulls to the Foundation Co., with works at Newark, N. J.; for 12 wooden hulls to the Groton Iron Works, with plant at Noank, Conn., and for two wooden hulls to the Ship Construction & Trading Co., with works at Stonington, Conn.

Of the 10 steel ships awarded to the Seattle company the first and second are to be delivered in June, 1918, the third in July, the fourth and fifth in August, the sixth in September, the seventh and eighth in October, the ninth in November, and the tenth in December. The Foundation company is to deliver its first wooden hull on March 1, 1918, and the remainder at the rate of one every 15 days thereafter. The last hull is to be delivered on or before Aug. 15. The Groton Iron Works is to deliver its first wooden hull five months after the receipt of lumber for the keels, and the remainder on an average of one every two weeks. All are to be delivered by Sept. 15. The Ship Construction & Trading Co. is to deliver the first of the two hulls awarded to it on or before Feb. 12, and the second on or before March 12.

A summary of awards made by the fleet corporation to date shows the number of contracts executed, 16; number ships and hulls contracted for, 138, including 28 complete steel ships, 32 complete composite ships, 30 complete wooden ships and 48 wooden hulls.

The Aluminum Ore Company of America, St. Louis, has purchased 14 steel barges to transport bauxite from the Arkansas mines to the aluminum plant at East St. Louis. The barges will deliver about 10,000 tons of ore to the factory each week.

Structural Awards Droop

High Prices and Short Supplies Are Effective in Holding Up Work—Government Jobs Principal Feature

New York, June 19.—Government business continues to furnish most of the activity in the structural market. Steel for a foundry at the League Island navy yard, and for a machine shop extension at the Brooklyn navy yard were placed this week and the general contract for the power houses at the League Island and Norfolk navy yards also have been closed. The bureau of yards and docks on June 25 will open bids on 4000 to 5000 tons for mine storage and other small buildings to be located in various sections of the country. Shipyard lettings this week include 2700 tons at Baltimore, and 1000 tons at Chester. Although fabricators of late have not been asking the mills to protect them on so much forward tonnage, specifications on old contracts usually call for the full tonnage involved. New tonnage continues of larger proportions than the mills can book. Standard capacity is booked up five to 10 months, and special sections about three months. Plain material is around 4.50c, Pittsburgh, with 4.25c occasionally done. Ship shapes are at 6c, Pittsburgh. One maker is quoting 8c, Pittsburgh, for export.

Structural lettings in May fell off 4½ per cent or about 8000 tons compared with April, according to the records of the Bridge Builders' and Structural Society. Bookings were 56½ per cent of capacity.

Month.	Per cent.	Approx. tonnage.
May, 1917	56½	102,000
April	61	110,000
March	68	122,000
February	59	106,000
January	61½	119,000
Dec., 1916	86	148,000
Nov.	78	134,000
Oct.	77	133,500
Sep.	52½	99,400
Aug.	64	112,600
July	47½	83,600
June	58	100,000
May	80	137,000

Market Quiet at Pittsburgh

Pittsburgh, June 19.—Fabricators in the Pittsburgh district have taken no large contracts recently, but it generally is believed that building activity will be resumed just as soon as requirements of the government are more clearly defined. Structural shapes are selling at a wide range in price, depending largely upon the delivery. One mill is quoting 6c as a minimum for delivery at its convenience, but the 4c price has not disappeared entirely.

Scarcity Grows Pronounced

Buffalo, June 19.—The few selling agencies that are considering offers of new business now are quoting from 4.50c to 6c on shapes. The scarcity in this line is as pronounced as that found in the other mill products.

Structural Work Lags

Chicago, June 18.—Structural shops generally in the west only have work under contract sufficient for 90 days' operations. Little new contracting is being done as building for investment is practically impossible at present levels and industrial extensions seem to be slackening. Under these circumstances fabricating activity may be expected to lessen materially during the late summer. This will be made up to some degree by the government fabricating for standard steel ships for which plans are now being outlined. Recent sales here brought 6.19c, Chicago, for plain material.

CONTRACTS AWARDED.

Government arsenal, Watertown, Mass., 1000 tons to Ferguson Steel & Iron Co.

Extension to plant of Firestone Tire & Rubber Co., Akron, 1000 tons reinforcing bars placed by the Hunkin-Conkey Construction Co., general contractors; 1000 tons still pending.

Foundry at League Island navy yard, 3000 tons, to American Bridge Co.

Machine shop extension at Brooklyn navy yard, 800 tons, to American Bridge Co.

Buildings for Baltimore Dry Dock & Shipbuilding Co., 2700 tons, to Baltimore Iron Works.

Double tracking for Virginian railway, 650 tons, to Virginia Bridge & Iron Co.

Crane runways for Chester Shipbuilding Co., 1000 tons, to Levering & Gerrigues.

CONTRACTS PENDING.

Dock construction at Norfolk, Va., 1300 tons reinforcing bars, bids being taken.

Movable dam No. 14, New York state barge canal, Herkimer, N. Y., 200 tons structural, bids being taken.

Small buildings, mine storages, etc., for bureau of yards and docks, 4000 to 5000 tons, bids being taken.

Bridges for Pennsylvania railroad, 1500 tons, bids being taken.

Bridges for Chesapeake & Ohio railroad, 600 tons, bids being taken until June 25.

Power houses for League Island and Norfolk navy yards, 2000 tons, general contract to Roche Construction Co.

The Worcester, Mass., section of the American Society of Mechanical Engineers has by a mail vote elected the following executive committee for the ensuing year: George I. Rockwood, chairman; Richard G. Williams, secretary; Prof. Howard P. Fairfield, Victor E. Edwards and F. M. Parks, the latter of Fitchburg, Mass.

$10 Wire Advance

Made by Some Independents—Others Withdraw from Open Market

Pittsburgh, June 19.—Several independent manufacturers of wire products have advanced quotations $10 a ton to $4 a keg for nails, by far the highest price in the history of the trade. Some material already has been sold at the higher quotations. The American Steel & Wire Co. has made no changes in its prices since March 5, last, when it effected an advance of $4 a ton. On April 17, the Youngstown Sheet & Tube Co. put up its quotations on wire products $6 a ton to $3.50 a keg for nails, and other independent concerns followed suit. The leading interest has not been an active factor in the market for several months, although it is taking care of its regular trade. A year ago, wire products were offered at $48 a ton below prevailing maximum prices; wire nails were quoted at $1.60 a keg June 19, 1916. Specifications against contracts are described as heavy, although the market is not nearly so excited as it was 60 days ago.

Withdraw All Prices

Cleveland, June 19.—Some of the independent makers of wire products who have been quoting from 3.75c to 4c, Pittsburgh, on nails have withdrawn all prices. Quotations now are being made only on application and then are confined to regular customers. By a new railroad ruling, a minimum of 50,000 pounds on full car loading is being strictly insisted on. Lighter loads have been refused. It is understood that the recent government inquiries for 24,000 tons and 16,000 tons respectively of wire cables for torpedo and submarine nets have been allotted. A revived Russian inquiry called for 1,000,000 feet of wire cables or about 750 tons. The wire nails required for the various cantonments are placed at about 250,000 kegs or approximately 12,500 tons.

Nails Selling at $4

Chicago, June 19.—Nails are being sold at $4 per keg, Pittsburgh, while plain wire to jobbers commands $4.95 per 100 pounds. Wire to manufacturers, however, is selling at a premium over $4 per 100 pounds. These quotations apply to the output of an eastern independent, and large tonnages would not be taken by this seller.

Scrap Shortage is Acute

Dealers Scouring Country For Material—Prices Continue to Rise—Heavy Steel at $47, Pittsburgh—Rerolling Rails Scarce

Pittsburgh, June 19.—Many iron and steel scrap dealers who sold short the early part of this month have sustained heavy financial losses. Prices have been advancing so rapidly that many middlemen literally have been lost in the shuffle. Heavy melting steel, offered freely at considerably less than $30 a ton a month ago, has been sold at $47 and is held at $50 by some merchants. Rerolling rails and low phosphorus scrap are selling at $50 and above. Machine shop turnings and borings, drugs on the market when offered at $12.50 a ton, have passed the $20 price mark. No. 1 wrought scrap, axles, malleable and cast scrap are in heavy demand and are selling at from $5 to $15 a ton above quotations prevailing a few weeks ago. The Pennsylvania Railroad Co. last week sold about 20,000 tons of miscellaneous grades at the highest prices ever enjoyed by that company. The railroad embargo against the shipment of scrap to the plant of the Pittsburgh Steel Co. at Monessen, Pa., has been removed.

Dealers Cautious in Selling

New York, June 19.—Demand for iron and steel scrap of all descriptions shows no let-up. Following recent heavy sales, however, dealers in this district are more circumspect about taking new orders. Quotations now are from 50 cents to $7 a ton higher than a week ago, and it would be difficult to duplicate any of the present figures. The most sensational advances have been on steel axles, car wheels, steel shafting, heavy cast and machinery cast. These grades are most in demand and are hardest to get. Pittsburgh dealers continue to bid excitedly for heavy melting steel and freely have offered $36, New York. Considerable further tonnage was obtained at this level during the week. Eastern consumers have made no effort to buy heavy melting steel.

Change Wrought Specification

Philadelphia, June 18.—Among important developments in old material in this district is the more rigid specification on wrought scrap. For some time several leading mills have been restricting their wrought pipe purchases to material more than 1 inch in diameter and 2 feet in length. This specification now has been adopted by practically all eastern mills. So far smaller and shorter pipe has not been affected since a large quantity of it still is deliverable on old contracts. In future, however, it will be disposed of to mills which will shear it into busheling scrap; in fact some tonnage already has been sold for this purpose at $25 to $26, delivered. In general, the scrap market has not been so excited. The principal reason for this has been the shyness of sellers, already heavily committed. Heavy melting steel has been sold to Pittsburgh at $41, delivered. Pittsburgh buyers since have offered to pay $42. This grade is exceedingly strong. Low phosphorus steel has established new records, selling at $55 and $60. Iron boiler plate has sold at $45. The only grades which now are offered freely are in cast scrap.

Trading Lively at Cleveland

Cleveland, June 18.—Producers of scrap here and there appear willing to release tonnages at present high prices. Consumers are inquiring more freely. With dealers covering shortages the Cleveland market is more active than it has been for some time. Heavy melting steel is quoted at $40 to $42. New furnace practices are increasing the uses of scrap. One of the most important producers of open-hearth steel in this district is enabled by a coal tar spraying process to turn out three heats in 24 hours where only two were obtained before. Local consumers who several weeks ago were fairly long on stocks are beginning to run low. Some of them are buying outside of Cleveland. It is not believed that the scrap shortage is as acute here as it is reported to be in most other trading centers.

Price Records Shattered

Cincinnati, June 18.—All previous price records have been broken in scrap and some grades have almost reached the level of the lower grades of foundry pig iron. Since the beginning of the phenomenal marking up of prices about a month ago, there has not been a single recession. On the other hand advances have been steady and rapid. Users of both wrought and cast scrap seem to be eager to take all the metal they can get at latest quotations. Old iron axles are very firm around $45 to $46 per gross ton, and not much of this class of material can be had. As a rule, neither dealers nor buyers care to make any long-time contracts, as no one can forecast the future. It is believed certain that if pig iron continues to grow scarcer and dearer that scrap will maintain its advances. The car situation is still giving trouble, and bids fair to become worse instead of better.

Seek Scrap in South

Birmingham, June 19.—Sensational advances in scrap prices took place during the past week and a pronounced scarcity of many grades is threatened. Consumers in St. Louis, Chicago, New York, and elsewhere, have been wiring this district as to a possibility of getting certain kinds of scrap, only to meet with disappointment. Dealers made heavy contracts two weeks ago at prices much under the present quotations and now are skirmishing around for material with little success. All quotations are higher this week. Heavy melting steel has gone to $23, while No. 1 machinery scrap, strongly sought by consumers in the middle west, now is commanding $27.50 and more. A heavy consumer in St. Louis wired THE IRON TRADE REVIEW correspondent for the identity of sellers of No. 1 machinery scrap at $26. Inquiries developed that while $26 was quoted during the week of June 4 to 11, an advance of $2 and more had since taken place. Stove plate is one of the strong lines, and while $15.50 is given as a price, sales have been made higher.

Chicago Scrap Running Away

Chicago, June 18.—Scrap iron and steel prices in this market are almost impossible to quote with any degree of certainty. Advances are made with such frequency that it is almost impossible for observers to keep pace. Prices are so high that most brokers and dealers are curtailing their volume of business because of the tremendously increased capital or credit made necessary. Practically no short selling is being done and only such material as is actually in hand is being offered. Most consumers are seeking scrap, not for reserves, but for actual necessity. The time seems close when steel and iron mills may be forced to reduce operations because of insufficient raw material. Rerolling rails are quoted at $47 to $47.50, and sales have been made at that level. Heavy melting steel and similar grades are at about $40 per ton. This figure would apply only to small tonnages and considerable premium would be asked for round tonnages. It is understood a Cleveland buyer has paid $45 and expects to pay $50 shortly for heavy steel. Railroad offerings at present are almost absent. The Missouri, Kansas &

Texas railroad has the only list current, offering 750 tons of frogs, switches and guards.

Stock Piles are Vanishing

St. Louis, June 16.—There seems to be no limit to the upward course of scrap iron and steel prices in this territory. Another sharp revision upward has been made, advances ranging from $1 to $6 a ton. Certain items have attained levels equal to if not exceeding what was paid for the material when new. The feverish and excited condition of the market which has existed for the past month, was accentuated during the week by the entrance of new buyers who were apparently willing to take what was offered at any price. Dealers are striving to cover their short sales.

Offerings are scant and usually in small lots. Scrap piles in yards of leading dealers are vanishing. Railroads are offering little. The new lists of the week were 400 tons by the Lake Erie & Western and 750 tons by the Chicago & Alton. A leading melter has instructed his purchasing department to scout about for old iron and secure all that could be picked up at anything like a reasonable price. This action was taken, he said, because of the growing stringency in pig iron.

Buffalo Rise Goes Further

Buffalo, June 19.—Heavy melting steel in the Buffalo district has gone to $41 and $42, and several lots have just been sold at as high as $43. Aside from the advance of $1 to $2 per ton on a number of the lines, the local market continues in the same condition reported a week ago. Only limited tonnages of various grades are available as the scarcity increases. Car wheels are now being quoted at $34 to $36; clean borings and turnings have gone to $19 to $20; stove plate and grate bars to $21 to $22; bundled sheet stamping scrap to $22 to $23, and No. 1 railroad wrought to $33 to $34. The present price on No. 1 busheling is $29 to $30 and on No. 2 busheling, $20 to $21. Dealers

Spot Coke Advances to $12

Insufficient Car Supply Still Hampers Distribution—Furnace Managers Are Apprehensive Over Supplies—Foundries in Want

Pittsburgh, June 19.—Spot Connellsville furnace coke, offered at $9 a ton a few weeks ago, now is being sold at $12 per ton. While the car supply has been somewhat better the last few weeks than previously, the number of cars being diverted to the coke fields remain insufficient to meet demands of consumers. Moreover, not much coke is in transit and this is causing apprehension on the part of blast furnace managers. The car supply last week was about 65 per cent, as against about 60 per cent the first five months of this year. Demand for spot delivery is heavy. Sellers of foundry fuel are having no difficulty obtaining as high as $12.50, ovens, for both prompt and future shipment. Production of fuel the week ending June 9 was 361,088 tons, compared with 345,720 tons the week before, according to *The Connellsville Courier.*

Spot Foundry at $12.50

Philadelphia, June 18.—Prices on coke continue to advance rapidly. Spot foundry coke has sold at $12.50, Connellsville, and spot furnace coke at $11.

Quotations Range Widely

Cincinnati, June 18.—Coke is very firm and hard to get in the different producing fields. New river foundry coke is still quoted at from $12 to $13 per net ton at oven. Connellsville foundry is all the way from $10.50 to $11.50, and Wise county is about on the same level. Pocahontas foundry is not quite as firm and is quoted for nearby at $9 to $10.50. There has never been such a wide range in coke quotations among different operators as at present. Furnace coke quotations are difficult to obtain, as no late contracts have been made, but from $8.50 to $10.50 would about represent the average figures named by different selling agencies.

Deliveries are Disappointing

St. Louis, June 16.—Consumers of coke in this district are complaining bitterly of railroad accommodations. During the past week deliveries on contracts ranged from 30 to 40 per cent, with some few getting as high as 50 per cent. Several of the larger foundries are facing a serious situation. Sales of a few scattering cars to supply emergency needs are reported at fancy prices. On such transactions the price depends entirely upon how badly the coke is wanted. The general demand continues excellent. Owing to car shortage, some accumulation on dumps of by-product plants is noted, but not sufficient to appreciably relieve the general situation. Quotations are a shade firmer at $14.80 to $15.30 for 72-hour Connellsville and Virginia foundry coke, f.o.b. St. Louis or East St. Louis, for prompt shipment.

Southern Companies Stock Coke

Birmingham, June 19.—Coke production and delivery in Alabama show no change over last week. The make is much below demand. Prices are strong. Some new contracts are being made, effective July 1, that will go through the entire 1918. One of the larger companies of the Birmingham district has 65,000 tons of coke accumulated and has expressed a desire to have 250,000 tons. That is impossible with the producing facilities. It is believed that the Tennessee Coal, Iron & Railroad Co. will include extensions of by-product coke capacity in its new program of enlargements recently announced.

Coke Rates Advance

Freight rates on coke shipped in the territory east of the Mississippi river and north of the Ohio and Potomac rivers went up 15 cents a net ton on June 15. Iron ore rates advanced a few days earlier and coal rates may go up on July 1. The following table shows the new rates from the Connellsville region to leading consuming points:

Destination	Rate
Baltimore	$1.95
Buffalo	2.00
Canton, O.	1.55
Chicago	2.65
Cleveland	1.75
Columbus, O.	2.80
Detroit	2.25
E. St. Louis, Ill.	2.95
Erie, Pa.	1.80
Harrisburg, Pa.	1.85
Joliet, Ill.	2.65
Louisville, Ky.	2.65
Milwaukee	3.00
New York	3.00
Philadelphia	2.20
Pittsburgh	.90
Port Henry, N. Y.	2.95
Pottstown, Pa.	2.10
Reading, Pa.	2.00
Richmond, Va.	3.09
South Bethlehem, Pa.	2.15
Swedeland, Pa.	2.15
Toledo, O.	2.00
Wheeling, W. Va.	1.35
Valley points	1.35

$15 Tin Plate

Done for Nearby Shipment on Both Export and Domestic Business

Pittsburgh, June 19.—Fifteen dollars per base box has been paid for tin plate for nearby shipment. Eastern mills are reported to have sold rather heavy tonnages at that figure for export and a small mill in western Pennsylvania is said to have received several contracts for domestic delivery at the same price. Generally, mills have withdrawn from the market, although small lots of wasters are being sold at 10c and above.

Await Government Orders

Much-Needed Car Buying By Railroads Held Up Until Decision is Reached on Proposed Federal Purchase

New York, June 19.—Railroad buying of cars undoubtedly would be much heavier at this time were it not for uncertainty as to what action will be taken on the 100,000 cars which the government may purchase. All of the roads are badly in need of cars and in most cases it now simply is a question whether the government or the railroads themselves will have them built. Recent car awards include the following: Pennsylvania railroad, 1000 box cars to its own shops; Santa Fe, 5 gondolas; Copper Range, 15 ore cars; Bethlehem Steel Co., 50 gondolas; Inland Petroleum Co., 15 tank cars; Carnegie Steel Co., 60 tank cars; Evans-Thwing Refining Co., 30 tank cars, and Peerless Transit Line, 60 tank cars, all to the American Car & Foundry Co.; Mariana Coal Co., 1000 coal cars to Cambria Steel Co.; Norfolk & Western, 2000 box cars to its own shops; United States government, 5 armored cars, to Standard Steel Car Co.; Erie, 50 center construction, and Aliquippa & Southern, 50 gondolas, to Pressed Steel Car Co.; Grand Trunk rebuilding, 1500 wooden cars, to American Car & Foundry Co.; Canadian government, 5000 miscellaneous freight cars, to Canadian Car & Foundry Co. Phelps Dodge & Co. are in the market for 75 coke cars; the Northern Pacific for 1000 center sill constructions; Swift & Co. for 25 tank cars; Ohio Cities Gas Co. for 2500 underframes and trucks, and the United Verde Extension railroad 30 hoppers.

The American Locomotive Co. has taken six locomotives for the Rhodesian railway, six for the Sorocobana railroad and one for the Trinidad Shipping & Trading Co. The Baldwin Locomotive Co. has received orders for eight locomotives, including three for the Alan Wood Iron & Steel Co.

Angle bars continue to sell at 4.25c, eastern mill, but small lots have gone as high as 5c. On tie plates, 4c, mill, is a minimum, with sales at this figure. A number of eastern railroads have placed large orders for spikes.

Numerous lots of open-hearth rails ranging up to several hundred tons each have been sold during the past week to industrial companies at $70, mill.

Light Rails Sell at $70

Pittsburgh, June 19.—Light steel rails have been sold at as high as $70 a ton in the Pittsburgh district. Industrial and mining interests have been active buyers in the market. Railroad spikes are being held at 4.50c. Specifications are heavy, but not much new demand is reported.

Await U. S. Car Buying

Chicago, June 18.—Railroads apparently are keeping out of the market until the project of the government to buy 100,000 freight cars has been adopted or abandoned. It is understood three sample cars are being built according to government specifications and from these the type will be determined. These cars will not take precedence over other cars ordered previously but will allow shops to operate at capacity instead of only partially at present. Car shops have been unable to speed up on account of lack of prompt material. The Illinois Central railroad will build 250 wooden box cars and 250 wooden stock cars in its own shops as well as 75 steel underframe way cars, the steel for the latter having been ordered from the Bettendorf Co.

Rails Are Ordered

Cleveland, June 19.—An order for 2000 tons of rails for late next year delivery for the Detroit & Toledo Shore Line railroad has been placed with the Carnegie Steel Co. The Union Pacific is in the market for 50 locomotives.

Pipe is Advanced Sharply

Independent Mills Add $16 to $26 to Quotations—Oil Country Schedule Withdrawn—Cast Up $2 More

Pittsburgh, June 19.—Quotations on standard steel pipe have been advanced 8 to 13 points by several independent manufacturers, whose quotations now are from $26 to $38 a ton above those of the National Tube Co., which has made no changes in its prices since April 21. The last previous change in prices made by independent concerns was May 1, when discounts were lowered six points, equivalent to an advance of $12 a ton. It is reported that some mills will quote extra heavy and double extra heavy pipe only upon application. Prices have been withdrawn on oil country goods, including tubing, casing, drive and line pipe. Independent manufacturers of tubular goods have advanced prices five times, or from $44 to $50 a ton since Jan. 1, last. Prevailing quotations are the highest recorded in many years. Manufacturers of iron pipe have made no formal changes in prices since May 1, but new cards providing advances similar to those made by independent steel pipemakers likely will be distributed before the end of this week. Boiler tubes continue to be quoted at prices adopted April 2, but those quotations do not represent the market. The Gulf Refining Co. is negotiating for 100 miles of 6-inch steel line pipe, involving about 5000 tons.

East Also Raises Prices

New York, June 19.—Leading cast iron pipemakers again have advanced their prices $2 a ton. The new quotations are $60.50, delivered New York, for 6-inch Class B and $63.50 for 4-inch Class B. No public lettings of importance have been made during the week. Private demand keeps up well. It is understood that a southern maker during the week has taken 14,000 feet of 16-inch pipe for a proposed army cantonment in North Carolina.

Cast Pipe Up $2

Chicago, June 18.—Cast iron pipemakers have advanced quotations $2 per ton, bringing 6-inch and larger sizes to $60.50 and 4-inch to $63.50, delivered, Chicago. In spite of announcements that most larger cities have decided to go ahead with their improvements and extensions, this has not begun to show itself in the pipe market. Kansas City, Mo., is an exception and has placed about 3100 tons, 950 tons of smaller pipe going to the United States Cast Iron Pipe & Foundry Co. and 2210 tons of larger pipe to R. D. Wood & Co. Livingston, Mont., will open bids June 26 on 1500 tons.

Old Orders Fill Shops

Birmingham, Ala., June 19.—Cast iron pipe plants in the Birmingham district are melting iron actively, mainly on old contracts. Pipe prices range between $53 and $56 per ton. A number of proposals are being bid upon and awards are expected to be made shortly.

Judson C. Clements, senior member of the interstate commerce commission, died suddenly of heart trouble at his home in Washington Monday.

Webb Bill Being Groomed for Senate Action

Washington, June 19.—Having passed the house, 241 to 29, the Webb export bill will be called up in the senate at the earliest possible time by Senator Pomerene and pressed for a vote. The measure, which legalizes export selling agencies, was passed by the house in the form it was reported to the senate by the committee on interstate commerce at both the previous and the present sessions. In calling the measure up in the house, Representative Webb, chairman of the committee on judiciary, explained that the bill seeks to make it legal, if it is not already so, to organize co-operative selling agencies or associations among American exporters. These common selling agencies, it was pointed out, would be separate and distinct organizations for the sole purpose of engaging in export trade and would be made up of stockholders from the various exporting companies or individuals interested in this trade. One of the chief advantages, said Mr. Webb, would be the saving in cost to the exporting members of the association.

Establishes Fellowship

A fellowship in the Mellon Institute of Industrial Research at Pittsburgh has been established by the Refractories Manufacturers' association. This action is expected to be productive of valuable research knowledge in refractory clay and silica materials, since fire brick, in common with the rest of the rougher clay products is produced today in practically the same way as 50 years ago. The industrial fellowship at the Mellon institute, which is operated in connection with the University of Pittsburgh, was established six years ago and has rendered valuable service in applying science to industrial problems.

Light Old Stack July 1

The two Grand Rivers blast furnaces, at Grand Rivers, Ky., recently purchased by J. M. Overton, president of the Alabama Fuel & Iron Co., Nashville, Tenn., and associates, will be operated by the Suwanee Iron Co., which is now being organized. The company will have an authorized capital stock of $100,000, of which $60,000 has been paid in. Repairs are now being made and it is planned to relight one furnace by July 1, and the second by Jan. 1. Most of the ore will be secured from Russellville, Ala., but some local ore will be used. Both furnaces will run on foundry iron, their combined capacity being from 160 to 200 tons per day. For the present, the equipment now on the ground will be used, but later on new water tube boilers and an additional blowing engine will be installed. D. I. Miller is the engineer in charge of the work at Grand Rivers.

Building Engine Plant

The Duesenberg Motors Corp., which was recently incorporated in New York, with an authorized capital stock of $1,750,000, has started construction of a plant at Elizabeth, N. J., on the 9½-acre site. The first unit will contain 87,000 square feet of floor space and will be one and two stories of semi-fireproof construction. The company plans to build high power engines for automobile, marine and aeroplane purposes. At present, it is operating plants at Chicago and at Edgewater, N. J. The Chicago plant was formerly the Loew-Victor Engine Co. The Edgewater plant will be discontinued when the Elizabeth plant begins operating. The company has completed and been working on several contracts for engines for submarine-chasers for the Russian and Italian governments. J. R. Harbeck, the president, is vice president of the American Can Co. and Charles Stollberg, vice president, is a director. R. H. Crosby, secretary, is attorney for the American Can Co. The company will specialize on the Duesenberg engine, patented by Fred S. Duesenberg, who is chief engineer of the new company.

May Enlarge Ship Yards

The Bethlehem Steel Co. advises that the report that it plans to establish another ship building plant at Baltimore is without foundation at this time although it may be found necessary and desirable to extend its present yard at Sparrows Point in order to help meet the requirements of the government for merchant vessel tonnages. Such extensions may take the form either of facilities additional to those which the company already has at Sparrows Point or a separate plant in the immediate vicinity of the present yard. The decision will rest largely upon the type of vessel construction required by the government.

Forms Steel Company

The Superior Steel Corporation, of Seattle, has been organized by C. Lewis Casey, Thomas H. Pidduck and E. W. French, of Seattle. The capital stock is to be $750,000. The announced intention is to manufacture steel here from ore mined in British Columbia.

Will Fabricate Steel For Ships in South

Birmingham, Ala., June 18.—Following the news that the Birmingham Foundry & Machine Co. will build an addition to its plant to produce marine engines, is an announcement that a corporation has been formed, site has been selected and the government will supervise the building of a large plant here for the fabrication of steel for shipbuilding. It is announced that high officials of the government have sanctioned the erection of the plant in the Birmingham district and that the models have been accepted. Steel will be furnished by Pittsburgh and Birmingham manufacturers and will be fabricated here and taken to Charleston, S. C., for assembling. The plant is to be ready within four months. R. I Ingalls, of the Ingalls Iron Works of Birmingham, has been in Washington conferring with officials of the government on the proposition.

To Promote Fuel Saving

Joseph Harrington, advisory engineer in the use of powdered coal as fuel, has organized the United States Power & Furnace Co., with headquarters at 208 South La Salle street, Chicago. This corporation will enable Mr. Harrington to enlarge greatly the scope of his activities and will enable him further to promote economies in the use of coal as fuel in industrial practice. The United Power & Furnace Co. is prepared to design and construct powdered coal installations, metallurgical and special furnaces, steam power plants, pumping stations and all apparatus for the economical burning of fuel.

Building Steel Plant

Work is being pushed on the new plant of the Chattanooga Steel Co., Chattanooga, Tenn., of which C. E. James is president. Fourteen carloads of machinery are on the ground. The mill will be electrically operated.

Awarded Shell Contract

A contract for 1,000,000 projectiles for the navy, to be filled by Jan. 1, 1918, has been awarded to the Toledo Screw Products Co., Toledo. To provide for this output an addition is being built. A large order for 1-pound shells was completed a short time ago for the Russian government.

Abundant deposits of titanium ore have been discovered near Fredrikstad, Norway. A company has been capitalized at $1,000,000 to develop them.

President's Word

May be Necessary to Settle Goethals-Denman Ship Steel Row

Washington, June 20. (By wire.)—Sharp differences between Chairman Denman of the Shipping Board and General Goethals over the price of steel for the merchant shipbuilding program may be settled through the resignation of one or the other following a conference which the latter is to have with President Wilson, Friday. Chairman Denman saw the President Monday. General Goethals is said to be prepared to lay before President Wilson his side of the case justifying his action in naming tentative prices of 4.25c for plates, 4c for shapes and 3.75c for bars.

The prices now are being considered by the committee on steel products of the council of national defense, of which Judge Gary is chairman. It will report its findings within a few days to the general munitions board of the council. It may be that the President himself finally will settle the whole matter.

Support also is being given to a movement to have an investigation made of the cost of producing steel, but to continue the awarding of contracts for ships in meantime and to base contracts for steel on result of the investigation. The fact that Chairman Denman refused to sign the contract for 10 steel ships to Downey Construction Co., New York, because of the tentative price of $95 per ton named for the plates but later signed it when the price provisionally was cut to $56 is not significant one way or the other. Price in either case is subject to adjustment. The whole case seems to have been incited by certain people desirous of defeating the steel ship program.

Awarded Ten Ships

New York, June 20. (By wire.)—The Downey Shipbuilding Corp. announces its intention to make final payment and to take over Milliken Bros. plant about July 1 instead of August 1, as originally planned. The new owner will execute all contracts on Milliken Bros. books. The Downey corporation has received contract from the government for ten 7500-ton steel ships. The government will furnish the steel. No decision yet reached with regard to future plans of Milliken Bros.

The Carnegie Coal Co., Pittsburgh, has purchased 2500 acres of coal lands in Cross creek and Smith townships, Washington county, Pa., from the Atlas Coal Co., the Chartiers Mining Co. and the J. H. Sanford Coal Co. The Pittsburgh Coal Co., Pittsburgh, recently bought 900 acres in Washington county.

Mill Changes Made

T. P. Draper, has resigned as assistant superintendent of blast furnaces and steel department of the Youngstown Sheet & Tube Co., Youngstown, O., to become assistant general manager of the Trumbull Steel Co., Warren, O. Mr Draper was with the former company for nine years, previously having been with the Republic Iron & Steel Co., and the Inland Steel Co. F. C. Farrell has been named assistant superintendent of converting and blooming mill departments, while A. R. French succeeds to the position vacated by Mr. Farrell, as foreman of the converting mills. C. H. Elliott is assistant to H. S. Braman, superintendent of blast furnaces and steel departments.

Wage Scales

Continue Common to Most Districts—Stocks are Depleted

Pittsburgh, June 20. (By wire.) — Manufacturers of sheets and tin plate and officers of the Amalgamated Association of Iron, Steel and Tin Workers are attending a joint conference at Atlantic City to adopt a wage scale for the year beginning July 1, next. It is likely that the scales now in effect will be continued. Bar iron mill wage scales will be considered at a joint conference next week.

All independent manufacturers of wire products are now quoting $4 per keg for nails. Independent manufacturers of tubular goods who did not advance prices yesterday are awaiting developments.

James M. Johnson of Chicago, died June 10 after an illness of a year. He had been treasurer of James B. Clow & Sons since 1885.

The Non-Ferrous Metals

Copper Lead Spelter Tin

New York, June 19.—The metal markets have lapsed into a state of almost complete stagnation during the past week. The differences of opinion at Washington as to the prices which should be paid for metals and the continued uncertainty as to the quantities of materials to be required have deprived both buyers and sellers of initiative. Despite the prevailing inactivity, prices have been holding steady, except in the case of spelter, which has shown some indications of sagging off in the face of large supplies.

Two important factors have figured in the tin market recently. One of these is the arrangement under way between representatives of the various branches of the tin trade and the bureau of foreign and domestic commerce, to effect equitable distribution of tin arriving in this country. The other has been the absence of cables to the New York metal exchange from London; as the New York market hinges largely upon the London market for tin, the trade here has been uncertain as to how to move. Private advices from London Monday said there was an advance of £8 abroad that day, equivalent to 2c a pound. Accordingly sellers marked their prices up to the basis of 64c for spot Straits, but practically no trading was done. Spot Banca and Billiton are quoted about 58.50c. No. 1 Chinese tin is quoted about 55c to 56c.

Negotiations are nearing completion by which the government will purchase its next spelter requirements. It is understood considerably higher will be done than on the previous tonnage, when 11.50c was paid for high grade, 11c for intermediate and 9c for prime western. At present prime western is obtainable at 9.25c, St. Louis for June shipment and spot is obtainable at 9.37½c New York in the east. Prime western quotations follow: Prompt and June, 9.25c to 9.37½c, St. Louis; July and August, 9.50c, St. Louis.

Brass special continues quoted about 10c to 10.25c, while high grade prices range from 14c to 15.50c.

The lead trade has been momentarily expecting an announcement from Washington but to date no news has been forthcoming. Consumers have not yet become accustomed to the present high prices and consequently inquiry is light. Lead quotations follow: Prompt and June shipment, 12c to 12.25c, St. Louis; July, 12c.

The copper market is inactive. The larger consumers still are awaiting the government's decision and are not inclined to commit themselves, especially those companies which have munition contracts and do not know whether they are to be provided with copper by the government or are to supply themselves. Electrolytic prices follow: Spot and June, 32.75c to 33c; July, 32c; August, 31.50c; September, 30.50c; October, 30c; fourth quarter, 29.25c to 29.50c, on the basis of cash, New York. Prompt prime lake continues quoted nominally 32c to 32.50c. Prompt casting is quoted 30c to 31c.

Aside from occasional inquiries from munition makers, the antimony market has been comparatively inactive lately. Less speculative interest has been in evidence. Spot antimony is obtainable at 19.50c, duty paid. Chinese and Japanese brands for June shipment from the far east are quoted 15.75c, in bond; July, 15.37½c; August, 15.12½c.

Old metal dealers state there is a good demand for white metal but that copper scrap is extremely inactive. Owing to the strength of pig lead, the various grades of lead scrap have been advancing steadily, until now heavy lead is quoted at the record price of 10.50c to 10.75c, tea lead at 9.50c to 9.75c and close cut lead pipe joints at 12c to 12.50c. Mixed babbitt and No. 1 pewter have also been subject to substantial increases.

Fig. 1—New General Laboratory of the Youngstown Sheet & Tube Co.

Youngstown Mill Has New Laboratory

IN ORDER to bring the metallurgical, chemical, inspection and research departments into closer touch with each other, the Youngstown Sheet & Tube Co. decided some time ago to house all four departments in the same building. Accordingly, plans were drawn for a complete general laboratory equipped to meet every ordinary requirement. The exterior of the new building is shown in Fig. 1.

The building is a 3-story, U-shaped structure, having a frontage of 115 feet and wings 88 feet deep. The court between wings is 30 feet by 40 feet deep. The building is of fireproof construction throughout and each floor is self-supporting. A combination of wall bearing and column construction is employed.

Details of Construction

The walls and partitions are of brick and hollow tile. The exterior walls are buff brick trimmed with terra-cotta and stone. The floor and roof slabs are of reinforced concrete, while the finish of the floors is that best suited to the work done in each room. All offices have maple floors; halls, corridors, toilet and locker rooms are provided with terrazza; storage rooms have concrete or asphaltum floors; the machine shop and heat-treating room, physical testing laboratory, and test drilling room have wood block floors; and the floors of the chemical laboratories, acid storage and cement testing rooms are of asphaltum.

On the first floor of the building are located the experimental, physical and cement testing laboratories; two office rooms; apparatus, acid, and general storage rooms; fan, air tempering and electric power control rooms. On the second floor are the

FIG. 2—EACH WORK ROOM IS EQUIPPED WITH WATER, GAS, AIR AND ELECTRIC LINES

FIG. 3—THE TILE CEILING AND INDIRECT LIGHTING FORM AN EFFECTIVE COMBINATION

offices of the chief inspector and the metallurgist, together with their assistants, clerks and stenographers. The machine shop and heat-treating room for preparing specimens for physical testing or microscopic examination are also on this floor. Adjoining the office suite of the metallurgist are the microscopic, polishing and dark rooms; corrosion testing, calibration, locker, toilet and shower bath rooms.

Testing Apparatus

The equipment of the metallurgical departments consists of one 400,000 hydraulic and one 150,000 screw-driven testing machines manufactured by Riehle Bros., Philadelphia, one 100,000 screw-driven testing machine manufactured by the Tinius Olson Testing Machine Co., Philadelphia, and Brinell hardness and ductility testers. A heavy-duty Riehle specimen miller has been installed in the physical testing laboratory. The machine shop and heat-treating room contain a lathe manufactured by the Lodge & Shipley Machine Tool Co., Cincinnati, a shaper manufactured by Gould & Eberhardt, Newark, N. J., a milling machine made by the Cincinnati Milling Machine Co., two electric heat-treating furnaces manufactured by the Hoskins Mfg. Co., Detroit, two gas-fired, heat-treating furnaces manufactured by Tate, Jones & Co., Inc., Pittsburgh, and a drill press hack saw and tool grinder. The furnaces are equipped with rare metal pyrometers.

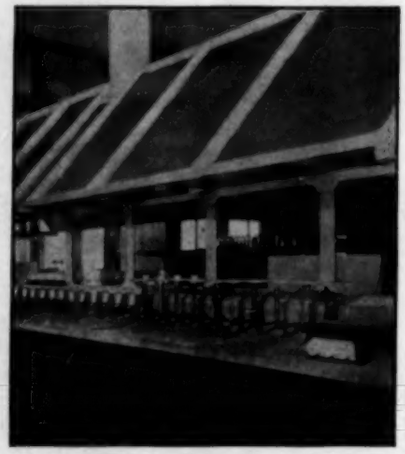


FIG. 5—ARRANGEMENT OF VENTILATING HOOD

The microscopic laboratory contains

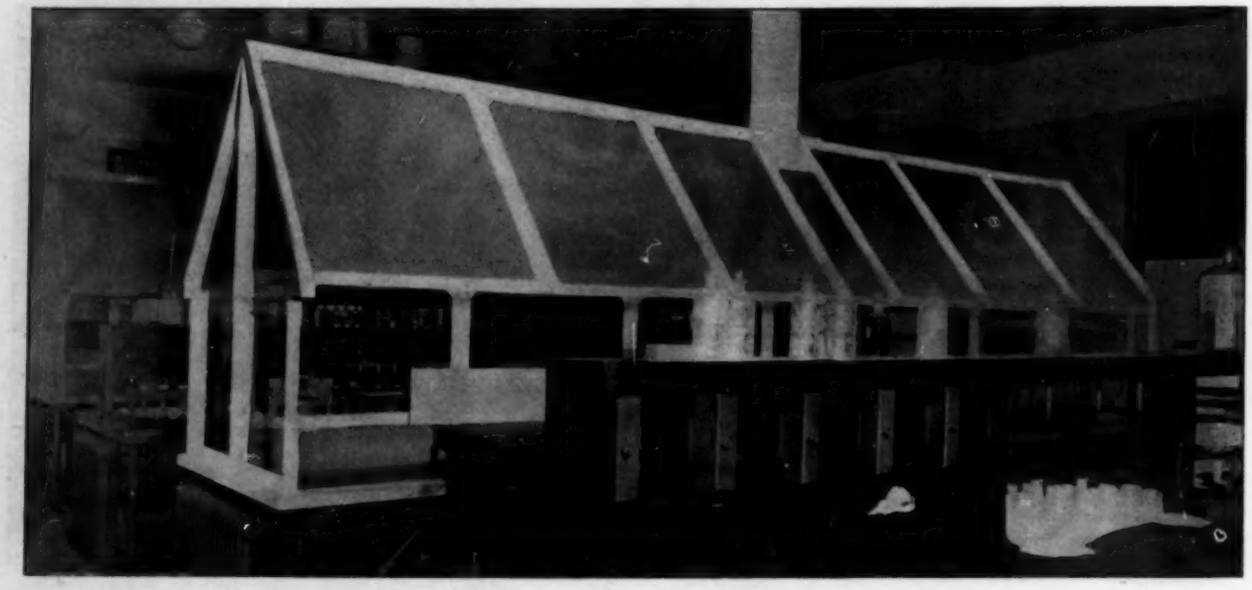


FIG. 4—THE LIGHTING, HEATING AND VENTILATING OF LABORATORY ROOMS IS OF LATEST DESIGN

two complete metallographical outfits made by Sauveur & Boylston, Cambridge, Mass., consisting of a small hood and the necessary tables and cabinets. In the polishing rooms are a vertical polishing motor manufactured by the Holtzer-Cabot Electric Co., Roxbury, Mass., cabinets for storage of samples and supplies, and a soapstone table and sink. All work rooms of this department are equipped with service lines for hot water, cold water, gas, compressed air, alternating and direct current power.

The third floor is occupied by the chemical department. On this floor are two office rooms and the following laboratories: Iron and steel, raw material, bacteria, water, solution, electrolytic, by-product, calorimetric and gas. Adjoining the office of the chief chemist is a private laboratory. All rooms are equipped so that they may be used for any analytical or chemical testing work by changing the movable apparatus. Each room except one is equipped with hood, tables and service lines for hot water, cold water, compressed air, vacuum, natural gas, steam, alternating and direct current power.

The floors of all chemical laboratories are of asphaltum, in which Trinidad asphalt with crushed silica rock is used. The walls and ceilings are tile. All wood trim is of golden oak. The table tops are birch, finished in acid proof black; the hood bases and sinks are soapstone. The acid drain from the sinks, and the floor drains are glazed tile, the joints of which are packed with a kaolin and asphalt mixture.

The building is heated by direct radiation, using low pressure steam. The chemical laboratories are supplied with tempered air from a motor driven fan located on the first floor, the ventilation of these rooms being completed by exhaust fans in pent houses on the roof of the building.

Service lines are carried into the building in tunnels inside the foundation walls connecting with vertical shafts which extend to various parts of the building. The gas lines in the hoods are in pipe boxes. Distilled water is provided in each wing of the building. The lighting is by the indirect system, and is made unusually effective by means of the tile walls and ceilings. The laboratory is connected with a central test drilling station in the mill by a pneumatic tube for carrying specimens. Analyses to the blast furnace, bessemer, open-hearth, rolling, metallurgical and shipping departments are reported by means of a telautograph system. Control laboratories are maintained at the Hubbard blast furnace, by-product and benzol plants.

Pioneer Days in American Steelmaking

BY S. T. WELLMAN

MY FATHER was superintendent of a small iron works among the hills of New Hampshire, which among other business included the rolling of steel locomotive tires, which were made from hammered-steel blooms imported from England. To properly heat these blooms arrangements had been made with C. W. Siemens to build a regenerative gas furnace. The drawings were sent over to our works and turned over to me (who had never seen a drawing of that kind before) to build. My father asked me if I thought I could build the furnace and have it exactly like the drawings. After studying them over a little while I told him that I thought I was equal to the task. He told me to get the furnace built at the earliest possible moment. I had just finished the furnace and had a drying-out fire in it when a big black-whiskered Englishman walked into the office and announced that he was the Siemens engineer who had been sent from England to build this particular furnace. My father turned him over to me to go out into the works and show him where the furnace was to be located, which I did, and my English friend was very much amazed to find it finished. He was pleased as well and said, "Why, we have only to start the furnace now. You have made a proper job of building it." So everything else being ready, we started up the gas producers and the furnace and everything worked to perfection. The engineer was so pleased with what had been done that when he left he asked me to go with him to Pittsburgh as his assistant in starting a crucible steel-melting furnace which was finished and waiting for him to start. It is needless to say that I did not have to have a second invitation, but went to Pittsburgh with him.

First Crucible Furnace

This was in 1867, and I spent over a year there. The first few months of that time were spent starting up and operating the first crucible steel-melting furnace built in America, at the works of Anderson, Cook & Co. To show what a tremendous saving this furnace was over the old coke-fired furnaces, I will only say that it melted a ton of steel with an average of 1000 pounds of nut coal which cost less than $1, while to melt a ton of steel in crucibles in the old-fashioned coke furnaces took 3 tons of the very best coke, costing from $2 to $10 per ton. This style of furnace was a great success, and in a very few years had driven the coke furnace out of use.

From Anderson, Cook & Co. I went to the Singer, Nimick & Co. works, where I built two crucible steel-melting furnaces of the same type as the one which I went to Pittsburgh to start. After that I spent some time in the office of the Siemens' agents in Boston, and also at steel works in different parts of the country, starting crucible steel furnaces of the same type. Then I built a crucible steel-melting furnace at the Chrome Steel Works in Brooklyn, N. Y., which was a success. From there I went to the Bay State Iron Works, in South Boston, Mass. (having separated myself from the agents of the Siemens furnace some time before this), where I built the first open-hearth furnace which was a commercial success in the United States. This made a quality of steel which up to that time had not been reached in this country. The principal use to which it was put at that time was in the manufacture of locomotive fire boxes. From there I went back to the old works in New Hampshire where my father was still superintendent, and built for them an open-hearth furnace, a plate-rolling and bar-rolling mill.

I came to Cleveland in 1873 to design and build the Otis Steel Works, with which I was connected as engineer and superintendent for 16 years. There are two inventions which I worked out during the time I was connected with the Otis company that are today absolutely indispensable to the economic operation of any open-hearth steelworks. I refer to the open-hearth charging machine and the use of the electromagnet for handling pig iron and scrap steel. Just a few figures will give you a little idea of their importance to the trade and what they are saving every day. There were made in this country

Extracts from a communication to the president of the Cleveland Engineering society by Mr. Wellman in reply to a letter making Mr. Wellman an honorary member of the society.

in 1916 approximately 36,000,000 tons of pig oron and about the same quantity of steel ingots of all kinds. Very conservative figures show that at least half of this, or say 20,000,000 tons, was pig iron and scrap handled and used in open-hearth furnaces. This was all handled by the open-hearth charging machine and electromagnet at least once, the bulk of it twice, and a great deal of it three times. By the use of the electric open-hearth charging machine the direct saving in labor is estimated by one of the large users at 25 cents per ton. This was about 10 years ago, and of course labor is much higher today. At the same time he estimated the indirect saving in handling material charged into the open-hearth furnace (calling it only 20,000,000 tons) of $10,000,000. If we go back 17 years, this saving amounts to not less than $85,000,000. The saving in labor by the use of the electromagnet in the United States per year at the rate pig iron and scrap are being handled today is not less than $1,500,000. We can very safely say that in the last 10 years at least five times that amount, or the sum of $7,500,000, has been saved, or a total for both of these inventions of nearly $100,000,000. Every open-hearth plant of any size in the world today is equipped with these inventions, and they are considered as much a necessary part of the equipment as the furnace itself.

Proper Heats For Finishing Forgings

BY E. O'CONNER ACKER

A GOOD forging depends upon the composition of the metal, process of melting, care in melting, design and character of ingot mold, conditions of pouring and cooling, temperature and time of reheating, amount and character of hot working, finishing temperature, final section, subsequent treatment and manner of testing.

While all the points in Mr. Cox's paper are of the greatest importance, I will dwell only on one or two of them. One of the most important points is the proper finishing temperature and probably this has been neglected as much as any other point in the making of forgings in this country. Perhaps not over 10 per cent of the forgings made today are finished at the right temperature. Many years ago it was customary to finish much colder and to very much closer dimensions than is done today. Part of this is undoubtedly due to the fact that at that time steel shafting was selling from 8c to 10c per pound, but since then, prices as low as 2c and 2.25c have been received.

The forgings made at that time usually had a glaze or polish when taken from the forge and were very true to dimensions. The physical results obtained from this material were such that the younger generation of people in the business do not credit them as being true, and this in spite of the fact that heat treatment at that time was not as well understood as it is at present.

We made a shaft for the United States cruiser California which averaged in six different test bars 70,000 pounds tensile strength per square inch with an average elongation of 40 per cent. This shaft was simply annealed at a temperature of about 1,150 to 1,200 degrees Fahr. In other words, the proper forging at the right finishing temperature puts into steel a condition which cannot be equalled by shafts given the best heat treatment, but which are not properly forged. This is a subject which is not well understood and the microscope does not seem to aid in its solution.

High Quality Forgings

The qualities of the rifle barrel steel which is used by the government in the manufacture of small arms are so high that it is necessary to finish it at the rolls at a temperature slightly below the absorption point of the steel. The qualities usually obtained in this material are about 130,000 pounds tensile strength per square inch, 75,000 pounds elastic limit per square inch, with 20 per cent elongation and about 50 per cent reduction of area. These bars after being rolled have the same glaze or polish as the shaft before mentioned.

A large manufacturer has a specification for bars approximately 5 inches in diameter which are required to be swaged under a hammer; these bars are of extremely high physical quality which is thought to be due to the swage action. Undoubtedly, however, these qualities are simply obtained on account of the fact that the finishing temperature in this operation is about what it should be for this class of steel. It will be noted from Mr. Cox's paper that there is no inherent virtue in a press as distinguished from a hammer, so far as the physical condition of the forging is concerned. An important point, however, is that the tool doing the work should be in proportion to the size of the work done; in other words, we would expect a shaft made under a hammer of the proper dimensions to be very much superior to a forging made under a press which was too light for the work, modifying this statement by the fact that it is practically necessary to make large, hollow forgings under the press.

The principal reason we do not get as good a condition in rolled material as compared with forged material is also due to the higher finishing temperature at which material leaves the rolls. The reason for this being, of course, that loss of output and breakage of the rolls would necessarily result from the attempt to finish at nearer the proper heat.

The rolled armor plate to which Mr. Cox referred in the latter part of his article, is rolled by very powerful mills in which the finishing temperature is kept fairly close to what it should be. Even in that case the work does not penetrate to the middle of the masses as well as it would if the plates were forged. It would seem that an axle finished at the proper temperature in the rolls should be at least equal to that made under a hammer if the finishing temperature is the same, because undoubtedly the regularity with which the work is applied from the rolls must be to its advantage.

The idea now largely held that scientific heat treatment can correct the effect of improper forgings is very much in line with the idea that improper melting can be cured by adding "medicine" to the ladle. The proper melting in the furnace is only a part of the right condition of steel in the ingot as the designs of the molds and the proper method of pouring are equally important.

A discussion of a paper presented by John Lyman Cox, at the New York meeting of the American Iron and Steel Institute, May 25, 26. The author, E. O'Conner Acker, is with the Bethlehem Steel Co., South Bethlehem, Pa.

Book Review

Organization in Accident Prevention, by Sidney Whitmore Ashe; cloth; 130 pages, 6 x 9 inches; published by the McGraw-Hill Book Co. and furnished by *The Iron Trade Review* for $1.50 net.

Accident prevention is occupying a constantly growing place in modern industrial life. Interest in accident prevention exists because of a hu-

manitarian desire to prevent suffering and the natural desire of the business man to keep his plant running at as near 100 per cent efficiency as possible. He cannot accomplish this if his working force is constantly shorthanded because of preventable accidents.

To make accident prevention truly effective, the employer must give careful study to ways and means and must see that his foremen and their assistants are prepared to work with him. In other words, he must have organized help. How this can be brought about most effectively is shown by the author of "Organization of Accident Prevention". "Fellowship, system, education and discipline are the four necessary elements in safety and health work." The co-operation of the employe, engendered by a feeling of fellowship, is the greatest help that the employer can have in safety work. Also, a definite system of work with definite men in charge is desirable in order to get satisfactory results. This system when perfected will contain a complete plan for the education of the employe in the methods of preventing accidents, and will also provide disciplinary measures which may be necessary in some cases to force the employe to take the prescribed precautions.

Chapter II discusses specific accidents which may be reduced by educational means. The author describes the best methods of avoiding these accidents and the most effective methods of treating them if they do occur. Another chapter is devoted to the consideration of the subject of medical and physical examination of employes with special reference to tuberculosis and hernia. The necessity of emergency treatment in the plant itself is discussed and the various emergency methods described. The author shows that an emergency hospital at a plant plays an important part in reducing amount of lost time resulting from accidents.

The vital necessity for accident prevention work is strikingly shown by the statistics given in the chapter entitled "Records, Analysis, Ratio Curves". Many interesting illustrations accompany the text.

Curious Uses of Steel For War Purposes

New and curious sidelights on the great war appear from time to time which indicate the important influence of relatively insignificant equipment or supplies on the iron and steel industry. The American Steel Export Co., New York, calls attention to enormous quantities of barbed wire which it has shipped to the belligerents. These have totaled 12,000 tons, an amount which when strung out in a single line would reach a distance of 86,000 miles. This barbed wire is a special military type with four large pointed barbs and painted olive drab. The wire is prepared so that the coils may be held in form by a single strand of wire so arranged that the entire coil may be tossed bodily from a trench and the binding wire released, allowing the whole coil to burst open and uncoil like a giant clock spring. This is said to afford an impenetrable barrier to the attacking troops. When time permits the barb wire is woven into intricate defensive works laid out with mathematical precision to offer the greatest resistance to advancing troops and providing an easy egress for the troops in the trenches should it be possible for them to advance.

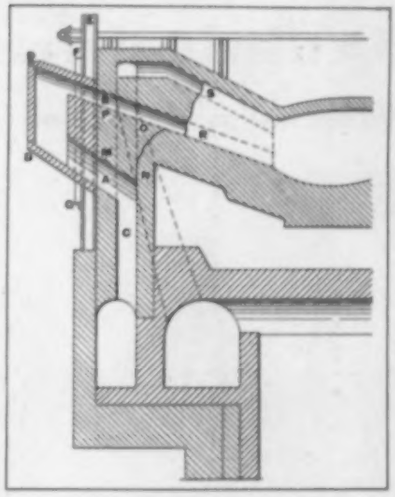


FIG. 1—SECTION OF OPEN HEARTH FURNACE PORT WITH CAGES

Another interesting commodity of war is the steel helmet which is used widely by the allies. Special high-carbon sheet steel is used to make these bullet shields which are fabricated in England and France from stock shipped from the United States. The various parts of the helmets are stamped on special presses. The parts are assembled by women workers. It is said that the total number of shields which have been made up to the present time reaches the enormous total of 12,000,000.

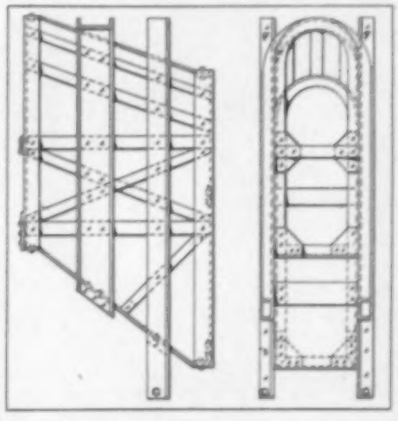


FIG. 2—IRON FRAMEWORK OF CAGE

Unique Port For Regenerative Furnaces

A new type gas port for open hearth furnaces has been applied to several furnaces in Austria and Hungary with considerable success. Improved operation is said to more than compensate for the cost of installation. Fig 1 is a sketch of a furnace port with the device ("cage") in position. The irregular line *R-S* represents the contour of the corroded port. The originally sharp edge at *O* has been worn away, as shown, by the gas in changing its course from the vertical flue to the slanting inlet. To prepare the port for the cage, the vertical flue is cut away from *A* to *B*, and an arched lining, *M, N, O, P*, is put in. (The portion above *B* was arched from the outset.) Recesses are cut in the front wall at *A* and *B* to correspond with the ports in the cage. The cage, which for a 35-ton furnace weighs nearly 3 tons, is lowered into place by means of a crane and well bedded in cement to make a close joint between cage and port. It is preferably secured by suspending it from the top of the vertical end girder, *E*, and bolting the angle irons, *F* and *G*, to this girder (Figs. 1 and 2.) Any uneven parts of the flues are next smoothed down through the open end, *D* D_1. After this opening is sealed up, the furnace is ready to resume working. If operations are carried on at both ends of the furnace, the four cages necessary can be installed in 12 hours, so that the furnace need not be stopped for more than a whole day.

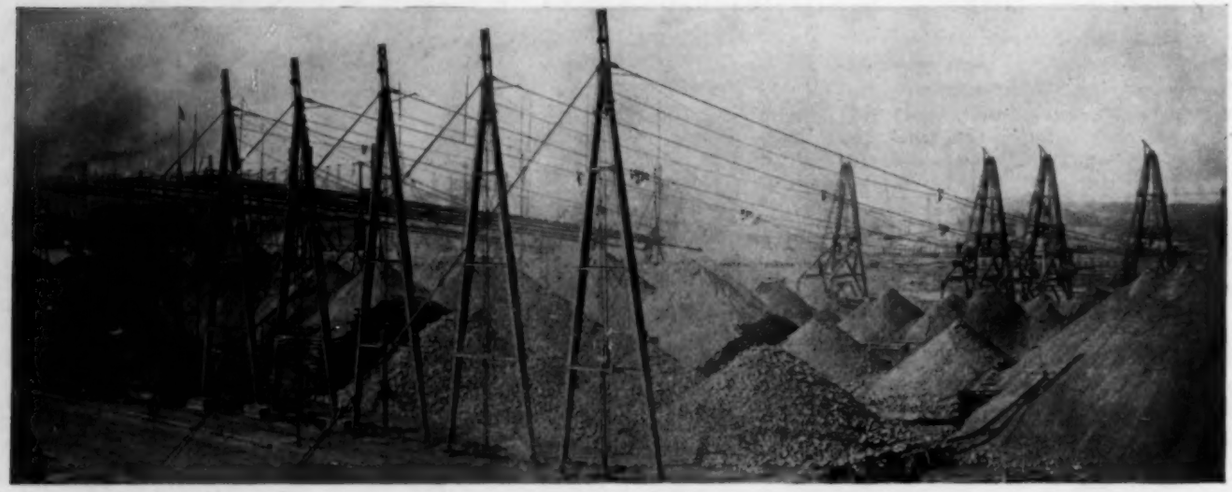
The conditions inside the furnace are favorably modified, inasmuch as the ports no longer project into the heated portion of the furnace, and are therefore well protected against further corrosion. Assuming that proper attention has been bestowed on the fire-bridge, the gas is conducted effectively and the furnace works normally. After putting in the cages the 34-ton furnace at Resicza has been run, on different occasions, for 202 and for 328 charges before being shut down for other repairs.

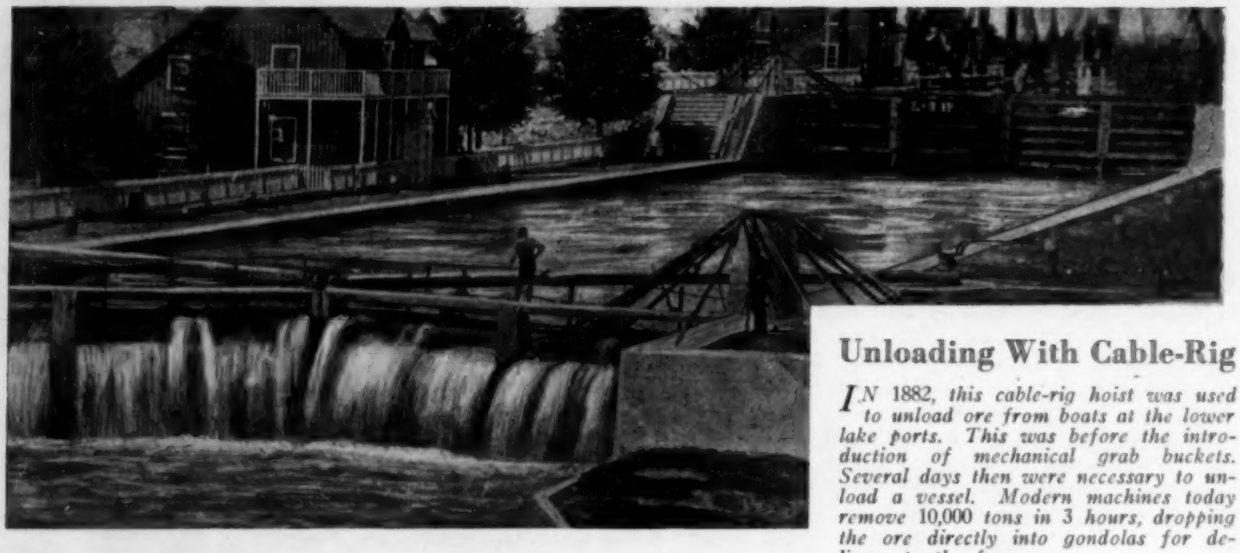
Among the advantages of the device is the fact that the ironwork of the four cages is a non-recurring outlay. An empty cage for a 34-ton furnace weighs 1,600 pounds, say 3½ tons of ironwork, with bolts, etc., included for

(*Concluded on page* 1342)

War Drives Iron Ore Industry at Maximum Speed

All Facilities of the Great Lakes Marshalled for Tremendous Task





Unloading With Cable-Rig

IN 1882, this cable-rig hoist was used to unload ore from boats at the lower lake ports. This was before the introduction of mechanical grab buckets. Several days then were necessary to unload a vessel. Modern machines today remove 10,000 tons in 3 hours, dropping the ore directly into gondolas for delivery to the furnaces.

* * *

Original Locks of 1855

THE original Soo locks, built in 1885, were in tandem and had a lift of 9 feet. The present artificial waterway forming the neck of the ore-shipping industry is 48 miles long and carries more traffic than any other highway in the world.

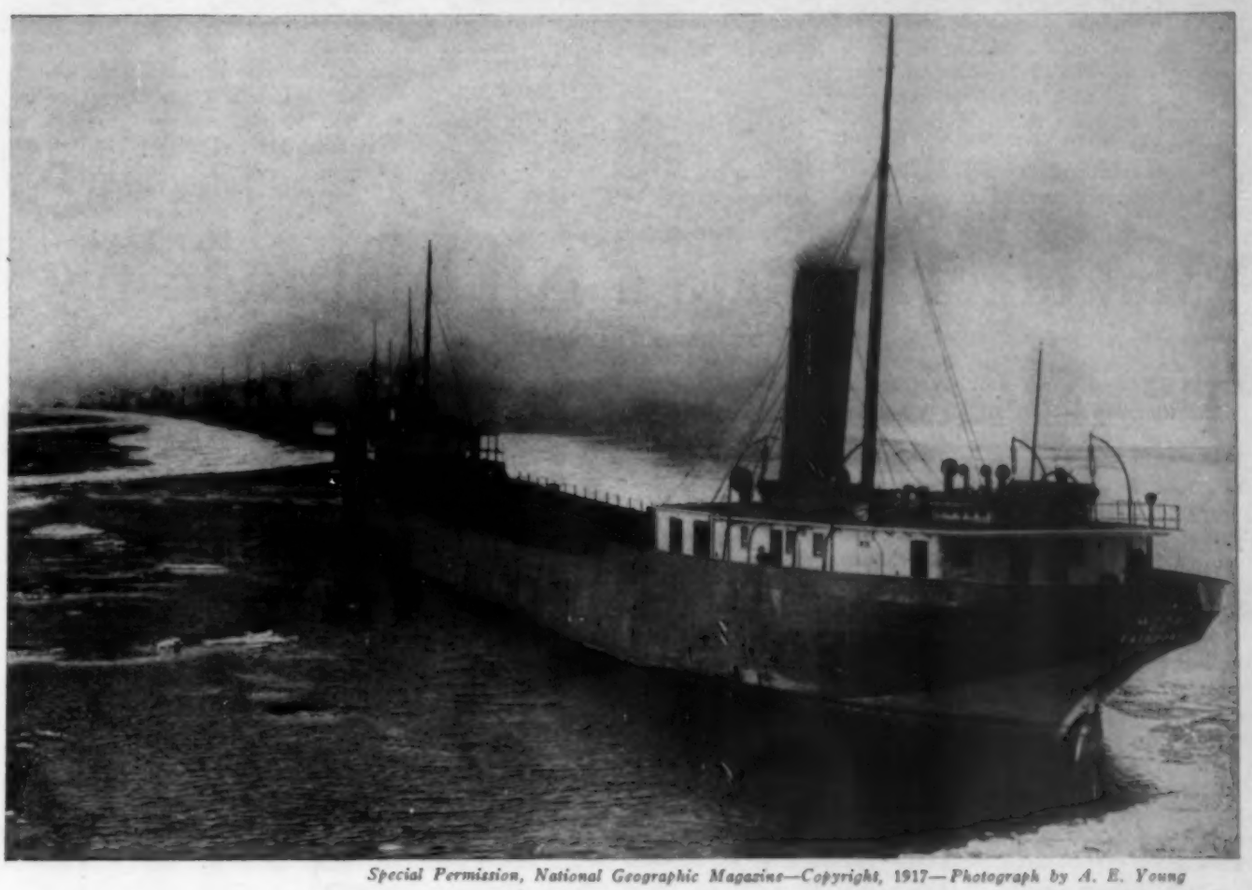
* * *

Ore Brig of the Fifties

ONE hundred and thirty-two tons, carried on the brig COLUMBIA'S *deck, was the first cargo of iron ore to pass through the canal. In all, 1447 tons were shipped through the Soo in 1885. Mammoth steel freighters of today hold 13,000 tons and can bring over 65,000,000 tons of ore in a season to the lower lake ports.*

Progress Makes Possible 65 Million-Ton Movement

Modern Equipment Assures Fullest Utilization of Nation's Resources



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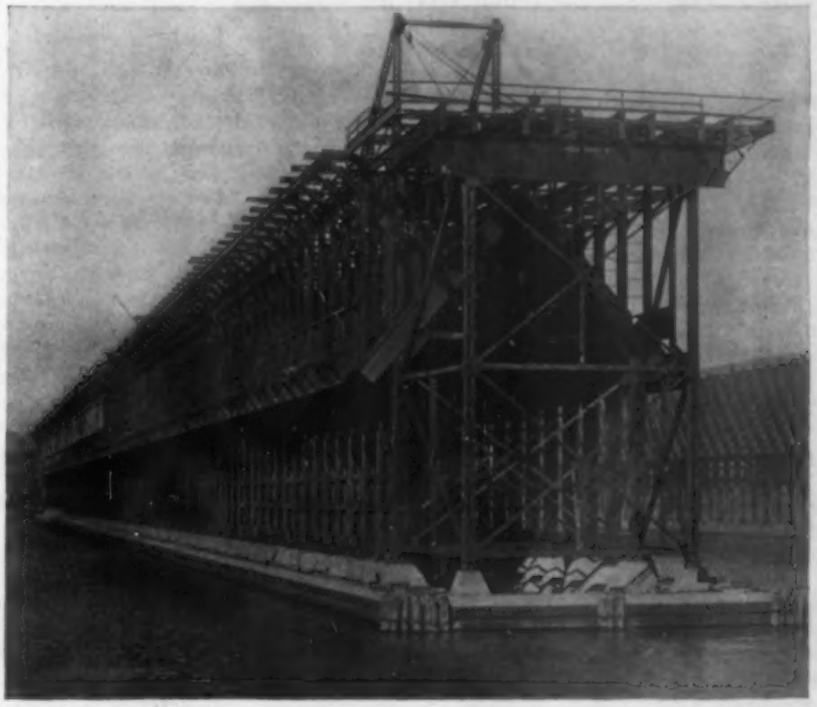
Following the Leader

WHEN the Soo canal was opened for the 1917 season scores of ore boats were ready to hurry to the upper lake docks to begin what promises to be the most momentous year in the history of lake traffic. For, to the extent that ore from the Superior ranges will find its way to the blast furnaces of the country, will the United States be able to throw its tremendous metal power into the battle for world democracy. With army and navy programs requiring from 30 to 40 per cent of the nation's steel, the importance of an enormous, limitless supply of iron ore is paramount.

* * *

Large Ore-Loading Dock

LOADING freighters is a simple task consuming a minimum of time with such docks as the one shown to the right. This dock, completed this year, is 1368 feet long and holds 80,000 tons of ore. Cars bring the iron ore directly from the mines and drop it into large bins from where it passes in the holds of the ships through chutes. The dock towers 80 feet above the water and has 228 pockets arranged in pairs on either side. Each pocket has a capacity of 5200 cubic feet.



Port for Furnaces

(*Concluded from page* 1339)

a set of four, the cost normally being $240. The brickwork for the four cages weighs 8 tons, the cost being $77. This brickwork does not need renewing completely when the cages are replaced. Fifty per cent of the brickwork is recovered each time, an amount at least equivalent to what would be required for repairing the port in ordinary circumstances.

Another important advantage claimed is the increased annual output from the furnace. The ordinary stoppages for small repairs, including heating up again, take at least 10 days each, or about 14 days in the year. Taking the average number of charges per day as four, the cages allow an increased production, in the 34-ton furnace, of about 1,900 tons per annum, or approximately 5 per cent of the normal capacity.

The production of copper in Russia has been considerably reduced since the beginning of the war owing to most of the labor having been pressed into the army and many of the mines having been seized by the enemy. Home consumption of copper in Russia had risen in 1913 to 34,300 tons, while the total imports were almost negligible. A production of 45,000 tons was expected in 1915, but the results were disappointing. The occupation of the Caucasus shops by the Turks in the winter of 1914-15 cut the home production for that year to 32,000 tons. During the past season Siberian copper production has been disorganized by lack of workmen. The net result is that imports of copper passed 13,000 tons in 1915 for the first time in many years.

Making Tin Plate a National Industry

BY ALFRED MARSHALL

THE first sheet mill erected for the manufacture of black sheets was built by Isaac Pennock in 1813 on the site of the ruins of an old saw mill, situated on the Brandywine near Coatesville, Pa. It was first a slitting mill and then was converted into a black sheet iron mill. After the death of Isaac Pennock, one of his daughters, Rebecca, married Dr. Charles Lukens, whose death occurred in the early forties, ran this mill and managed the entire business. She was a woman of great force of character as to energy and business sagacity, and many incidents of her life are worthy of emulation. This mill afterwards was converted into a plate mill, and from this small beginning the foundation was laid for the widely known works of the Lukens Iron & Steel Co., now the Lukens Steel Co., Coatesville, Pa.

The second sheet mill was erected in 1826 by James Wood, located at Wooddale, Red Clay Creek, Del., the great-grandfather of Richard G. Wood, now president of the Alan Wood Iron & Steel Co., Conshohocken, Pa. The third on the list was erected by my father and uncle, C. and J. Marshall, in 1836, four miles below, on the same stream, at Marshallton, Del. They first purchased a farm and grist mill, and before the close of the year, erected a sheet iron mill. The former adjuncts to the property, the farm and grist mill, were the sinews that held them together during those depressed times. The last two mills really were the only ones in existence until 1857, when another sheet mill was erected at North East, Md., by the McCullough Iron Co. I have often heard my father mention during those panic years, 1857 to 1861, "Boys, I want you to work on the farm, as I see nothing for you in the mill", as during those years these plants were mostly closed down, and it was only through the farm and grist mill they managed to pull through.

You can readily understand these early manufacturers had quite a struggle. Duties under the Walker tariff from 1846 to 1861 were in existence, and as it was only a revenue tariff, this was the next thing to no duty at all. This continued until March, 1861, when the Morrell tariff, a strong protective measure, was placed on the statute books. With the Civil war, this allowed all to start up on a paying basis, operations were very successful for several years and helped to build up these almost abandoned industries.

Galvanizing Process Introduced

A new departure in the manufacture of black sheets came along at this time in the galvanizing process. Those plants located on Red Clay creek increased their products by extending their faciities, and moved to Philadelphia and vicinity, Wood to Conshohocken and the Marshalls to Kensington on the Delaware river. The latter named their plant the Penn Treaty Iron Works, which was erected on the historic ground where Penn made his treaty with the Indians. Not only did we start the galvanizing of sheets, but also the production of lead coated sheets. The latter was done under an old English patent. We found under the Morrell tariff, by some misinterpretation of the metal clause, we had a protective duty on galvanized sheets, while the same sheets lead coated were discriminated against. They were placed under another classification providing a revenue duty with no protection whatever to the manufacturer of ternes or bright tin plate. These leaded sheets would only sell in competition with galvanized where sulphur gases, ammonia and acids abound, and therefore their market was very limited.

In the spring of 1883 a small group of sheet manufacturers met in the old Lewis building, Pittsburgh, and organized what then was known as the American Tin Plate association to educate the laymen as to the necessity of a protective duty on tin plates. We certainly did not appreciate at that time the vast amount of work that really was ahead of us. The buyers or importers of tin plate were arrayed solidly against us, in fact, some of the sheet manufacturers were really skeptical as to the success of our undertaking and lukewarm in their support.

The common layman had entirely a misconception as to the contents of the product. They did not seem to understand it was only sheet iron or steel coated with tin or lead and tin, commonly known as ternes. Therefore, it meant education in every direction. At least 40 per cent of the sheet iron was produced in a foreign country solely on account of a revenue duty. Unfortunately for our cause, the election the coming year gave us a revenue tariff man in the election of Grover Cleveland and a Democratic house, therefore the free trade propaganda was widely advertised.

During this administration, President Cleveland brought forward a message in December, 1887, of only 20 lines, advocating a tariff for revenue only, the briefest message ever sent to congress. A revenue measure known as the Mills bill was passed in the house but was defeated in the senate by a majority of two votes. But the fall of 1888 brought the election of Harrison and a Republican house and senate. The tin plate clause

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From a paper read at the recent Pittsburgh meeting of the National Hardware association. Mr. Marshall is with Marshall Bros. & Co., Philadelphia.

was a notable feature in that campaign. The organization of the house in 1889 gave us a strong protective ways and means committee with William McKinley as chairman and Tom Reed as speaker. The latter that winter gave us that historic decision that a majority of all members present should be counted, overturning the minority rule which had been prevalent in former sessions, making it almost impossible to pass any bill if the minority so decided. From that time on he was called the czar of the house, and certainly was an aggressive and dominant figure, while McKinley, with his persuasive eloquence, attended by great sincerity of purpose, carried the bill from defeat in the beginning of the session to a final victory. The vote on the tin plate clause was taken separately from the metal schedule and received only a majority of two votes, 151 to 149. Therefore, we must admit we owe a debt of gratitude to the combined efforts of these two great men, as our tin plate clause was in the minority at the beginning of the session until the last day, even up to the last hour. If we had been defeated it might have taken years to recover the lost ground. The Harrison administration went down to defeat in the fall of 1892 in the election of Grover Cleveland for the second time, who was supported by both houses in behalf of another revenue tariff bill.

In the spring of 1893 a new ways and means committee in the house and a new finance committee in the senate were rampant for a revenue duty tariff and succeeded that year in giving us a low tariff schedule, reducing the tin plate duty to its former rate, 1 cent per pound. These years, from 1893 to 1896, did not show much growth in this industry, first on account of the manufacturer not being prepared to make large quantities, and secondly because of political conditions, but in the fall of 1896 William McKinley was elected President with a Republican house and senate, changing the complexion of the committee to a protective basis, and for the first time we commenced to realize our success more than ever before.

The bill known as the Dingley bill was passed by both houses and our tin plate industry, as well as other lines of the metal schedule, was resuscitated. From this time its growth took on new life and has made wonderful progress up to the present time.

Developing Japan's Iron Industry

IN A SERIES of articles in the *Zasei Keizai Jiho* (*Financial and Economic Review*), Dr. Jisaburo Yokobori, a mining expert, makes a study of the iron industry of Japan. Dr. Yokobori attributes Japan's tardy progress to imperfect means of communication in the past, and a consequent difficulty in obtaining coal. The insufficient output of iron ore in the country may have hampered the progress of iron manufacturers to some extent, but this was not the principal cause. For the satisfactory development of the industry in any locality three factors, he points out, are requisite—production of ore at an available distance, easy supply of coal, and free communications to sites of foundries. It sometimes happens from these considerations that neither iron-producing districts nor coal districts are suited as sites for foundries.

Output Insufficient

The output of iron ore in Japan is not sufficient to meet the demands of its foundries, though there may be some increase of production as a result of the opening of new mines. Thus arises the problem as to where Japan can get her raw materials. At present large quantities of iron ore come from Chosen, Manchuria and China; indeed, the Tayeh mine in Hupeh province, China, supplies more than half the quantity required at the government foundry at Wakamatsu; and the Oriental Iron Foundry Co., recently organized by Japanese business men, will get the materials from the Tao Chung mine in Anhwei province, China, the quality of which is even superior to that of the ore that is obtained from the Tayeh mine.

Since the price of iron manufactures is low compared with those of other metals, the question of freight charges for the importation of ore becomes an important and difficult consideration in the successful management of iron business. Before the outbreak of the war freight rates between Chosen and Wakamatsu ranged from 2 to 3 yen ($1 to $1.50) per ton of ore, and those between the Yangtze river and Wakamatsu averaged nearly 3 yen. Two tons of ore and seven yens' ($3.50) worth of coke are necessary to produce one ton of pig iron, which sells for 20 yen ($10) in ordinary times. When imported materials are used, the cost of production, excluding the price of ore and refining expenses, is 12 to 13 yen ($6 to $6.50) per ton of pig iron. The government foundry at Wakamatsu, however, is getting the produce of the Tayeh mine on comparatively easy terms because of its connection with the Tayehping Iron & Coal Co., which owns the mine.

As the sound development of an industry is dependent upon the steady supply of raw materials, it is obvious that such subsidiary industries should be properly encouraged or protected. From this point of view, Dr. Yokobori points out the benefit of abolishing or at least unifying the likin duties of China placed on iron ore, and at the same time of reducing Japanese import duties on this material. When such problems are satisfactorily solved, and the mining resources of China developed, Japan will be able to draw raw materials from that country sufficient to meet the demand of her growing iron industry.

Some apprehension is expressed as to relying on other countries for the raw material of an industry of national importance such as iron manufacture, but Dr. Yokobori states that even such iron manufacturing countries as England, France, Germany, and the United States import large quantities of ore from other countries. If the economic relations between Japan and China continue to be close and intimate, there is nothing to fear, says Dr. Yokobori, that would affect the supply of materials from that country.

Increase Coal Supply

He next considers the supply of coal, of which Japan produces enough in Kyushu and Hokkaido. There is every prospect of increasing the output from the collieries in the north of Kyushu, while it might be said of the coal industry in Hokkaido that it is just beginning. He is very hopeful of the future of Hokkaido as an iron manufacturing district, for the island possesses excellent qualifications, producing both coal and iron ore. When the inland communications of Hokkaido become further developed, the island will be still more fitted as a center for the iron industry of Japan. Incidentally the growth of industries in the island will serve to relieve overpopulation in other parts of Japan.

Dr. Yokobori advocates placing a limit on the variety of iron and steel manufactures, in order to put greater emphasis and effort on the quality of that which is produced.

Analyzing Character by Observation

In This, the Second of a Series of Articles on Character Analysis, the Author Enumerates Traits Characteristic of Diversified and Conservative Temperaments—Significance of Blond and Brunette

BY WILLIAM JUDSON KIBBY

SINCE early civilization we have known that everything in the world is in a state of motion or vibration. We have only of recent years connected this in a practical way with the study of human nature. We find that every human being is in a state of motion or vibration. In one extreme we have the albino, and at the other extreme we have the dark negro; all races of the world group themselves between these two. Science reveals to us that all matter is positively in a ceaseless state of motion or vibration; that objects which vibrate at a high rate of speed govern and generate positive and active forms of force; and that objects which vibrate at a somewhat low rate of speed are endowed with static, slow and passive forms of force. Therefore, persons of the active or dynamic personality will be known as those of diversified temperament; those in whom the static or passive characteristics predominate are of the conserving type.

Temperamental Combinations

The student who wishes to become an accurate judge of human nature must learn to analyze temperamental combinations, which are shown in color, form, architecture, proportion, etc., and to find in each step in the analysis which element or elements predominate. The diversified temperament is distinguished by light hair, eyes and flesh, and the conserving by dark hair, eyes and flesh.

We shall refer to the diversified temperament classification as the blond type. The blond type exists when diversified elements predominate over the cohesive tendencies. The purer blond type is found mostly in northern countries or in temperature latitudes. Persons of this type are adapted to live in cold climates because of the great amount of heat which they generate. Some of the indications characteristic of the blond types are their soft, moist, pliable, warm, white, ruddy, florid coloring and somewhat transparent, glossy skin; light-brown, flaxen, auburn or red hair; and light and drak gray, blue or green eyes. The tissues and fibers of the body are soft and easily yield to the touch. They are given to warmth and vigor and great functional activity. It is not uncommon for them to be remarkably brilliant and of versatile disposition. They love the lights, the crowds and are as a rule very fond of good living. They are quickly and deeply exercised by pain or pleasure, and change rapidly from one state of mind or activity to another. The circulation of the body of the blond type is very rapid, accounting for the fact that so many of the people who live in the cooler climates are of blond type. Persons of this classification are distinguished for their natural craving, and in extreme cases for an excessive love for high places. They unconsciously dominate and desire to rule. It has been proved that a majority of high executives in our commercial, industrial and business life are of the blond type. They are inclined to avoid arduous work and tasks which call for continuous great concentration of mind and energy upon one theme or plan, and therefore they are seldom deep students.

The average person of the blond type can catch the significant thought of the subject, and being of the versatile nature, can make practical use of everything he knows and touches. He can read a book which has consumed a life-time in the making, and within a few hours catch the dynamic force of it and put it into use at once; thus he often becomes a brilliant leader. He is an ardent lover of sports. We find that a large majority of our sailors are of the blond type. They love to move around and to keep out of doors. It is estimated that 90 per cent of the organizers of industrial and business organizations are men of the blond type.

Brunettes Conservative

Persons who possess the conserving temperament feel responsibility more keenly. They are more studious, less optimistic, but far more dependable than those of the blond type. They are much more easily satisfied, and are not so often found in the "crowd". They content themselves with industrious pursuits; they do not crave and seek luxury. Being of a more serious, intense turn of mind, they have less desire of commendation from their fellows. Nearly all of the great research work of the world has been done by men and women of the conserving type. They are students with a technical turn of mind, and have great patience for scientific research and discovery.

We will classify persons of the conserving temperament as the brunette type. The circulation of the body of the brunette type is not as rapid as that of the blond type. The abundance of pigmentation or iron gives the brunette type the dark eyes, flesh and hair. The brunette type exists where the conserving or cohesive tendencies, as is shown in the dark color, dominate over the diversified temperament. There are many combinations of colors of hair, eyes and skin to be considered in determining whether a person is of the

ALBINO ← 100 90 80 70 60 50 60 70 80 90 100 → NEGRO

COLOR OF HAIR	WHITE	FLAXEN	GOLDEN	RED OR AUBURN	LIGHT BROWN	DARK BROWN	BROWN or Moderate BLACK	DARK BROWN or BLACK	BLACK	BROWN OR YELLOW RACES	NEGRO OR BLACK RACE	COLOR OF HAIR
COLOR OF EYES	PINK	LIGHT BLUE	LIGHT BLUE	LIGHT GRAY or BLUE	DARK BLUE	DARK BLUE or GRAY	LIGHT BROWN or HAZEL	BROWN	BLACK	BROWN OR YELLOW RACES	NEGRO OR BLACK RACE	COLOR OF EYES
COLOR OF FLESH	WHITE	PINK	FAIR	FAIR	TINTED	DARK TINGE	DARK TINGE	Brunette	OLIVE	BROWN OR YELLOW RACES	NEGRO OR BLACK RACE	COLOR OF FLESH

COMPARATIVE SCALE OF DIVERSIFIED AND CONSERVING TEMPERAMENTS

blond or brunette type. All three elements should be weighed and conclusions should be drawn from the average rather than from a single factor, as for instance the color of the hair. On account of the circulation of the body being moderate or slow, the brunette type is found more in hot or warm climates, because they readily absorb light and heat. Some of the dominant characteristics of the brunette type are the dark, hard skin, of olive or dark, swarthy coloring, black or brown hair and dark eyes. As a rule, a rugged body is characteristic of the typical brunette type. Persons of this classification are of a concentrated temperament and are strong-willed, dignified and serious. Persons of the blond type may devote a portion of each day to eight or 10 disassociated interests without confusion, while those of the brunette type, having a keener sense of responsibility and being less fond of approval and of a concentrative mind, would become confused if compelled to attend to the same number of disassociated interests. The brunette enjoys the company of a few friends, and his love of enjoyment is quite moderate in proportion to that of the blond. He is content to spend a great deal of his time by himself, in study and seclusion. He is fond of children, the woods, the green fields, and is not found nearly so often in places of amusement; while the blond prefers to have many friends, but seldom has many close ones. The blond is usually more democratic and makes friends with everyone, much more so than the brunette. Some one must do concentrated work, study details, work upon problems that need tremendous concentration of mind and body and yet not worry and fret. Therefore, when the work at hand calls for an individual who must do a specific thing in concentrated form, we rely on men of the brunette type. The characteristics which go to make up the personality of the highest type of man are not confined to either the blonds or brunettes. It is the happy combination of the two that gives an even balance.

The working of the mind of the man of diversified temperament is in contrast to that of men of the conserving type. His thoughts, while directed or concentrated upon one object, will constantly jump to these other little dots; in other words, the mind is constantly on the alert thinking about many other things while in the act of doing one specific thing. The mind has an irresistible tendency to consider many disassociated subjects, and is able to grapple with many unrelated interests. It is not painful for those of this temperament to let their minds jump in this fashion. Men of the conserving temperament while in the act of performing the one duty, do not grasp as many different or disassociated interests or thoughts. Individuals of this type are inclined to conserve their thoughts and therefore they have better control. Men of diversified temperament can learn valuable lessons from those of the conserving type by not attempting to think of so many disassociated things; that is, by concentrating the mind. By thus observing the trait's characteristic of the conserving temperament, persons of the diversified temperament may acquire greater ability to concentrate and will become more efficient. Perseverance may be developed in the same manner, and this is especially valuable for the blond, for it is often true that men of the diversified temperament are inclined to leave tasks uncompleted. They are not as thorough as are men of the conservative type.

On the other hand, those of the conserving temperament should observe the traits characteristic of the diversified temperament and thereby learn to broaden their activities by attempting to broaden the scope of their energies.

Diversified temperament is often confused with nervous energy, which is an entirely different consideration. One may have great activity of mind and body due to nervousness. Blonds may be diversified in their activities and the brunettes conservative, yet both may have a nervous temperament. Nervousness is a destroying factor in persons of any temperament.

War Changes Truck Design

AT THE April meeting of the Cleveland Engineering society, H. D. Church, chief engineer, truck division, Packard Motor Car Co., Detroit, read a paper entitled, "Military Influence on Motor Truck Design." In discussing the changes which war conditions have imposed on motor truck construction, which in turn has affected the shop practice, Mr. Church said, in part:

"The commercial motor truck of today is essentially a hard road vehicle, and when used over such roads would naturally not require any radical changes in design to meet military conditions.

"In event of any fighting on American soil at any time for several years to come, it is most improbable that similar conditions to those just outlined would exist. Our borders are so long that permanent trench fighting on a large scale probably would not take place, and the roads in this country are far inferior to those of France and Germany. It follows, therefore, that a truck designed for satisfactory military operation in this country, which means for use in connection with mobile field operations over mediocre roads, or in some cases, no roads at all, must necessarily be of a design differing in many respects from our present type of commercial vehicle.

"One of the first and most important points in connection with the design of a military truck is the absolute necessity for governors on the motors, not only to limit the maximum vehicle speed on high gear, but also to limit the maximum speed of revolution of any of the gears.

"A highly desirable feature would be the use of some form of differential which will automatically prevent one wheel from spinning if it loses traction, and which will still function as a differential when the truck makes a turn.

"To take care of excessive frame distortion, which is unavoidable when operating over rough or soft roads, the radiator, motor and transmission should be carried on 3-point suspensions, and with clearances sufficient to obviate any possibility of their being themselves distorted.

"In the absence of such a plan, it is probable the United States war department specification when issued, will stand as a sort of standard master specification for American truck manufacturers, in that, as they bring out new models from time to time, they will incorporate in the design such features covered in the war department specification as will not detract in any way from the commercial value of the truck, and, at the same time, so design the other parts that with minimum change, modifications could be added to meet the remainder of the specification. If this procedure is followed, the war department will eventually be able to purchase, at comparatively short notice, trucks which much more nearly meet its requirements than anything on the market today; and furthermore, many of the features found necessary from army experience on the Mexican border will, if incorporated in our commercial trucks, materially enlarge their operating field."

The Heat Treatment of Iron Chain

An Investigation of the Causes of the Comparative Weakness of Power-Forged Wrought-Iron Chain—Results of Experiments Leading to Their Removal by Heat Treatment Are Given

BY W. W. WEBSTER AND E. L. PATCH

WHEN in 1914 the United States navy yard at Boston began making iron cable by the steam-hammer process, instead of by hand, after the fashion of old English chainmakers, several problems involving a careful comparison of the two methods were confronted. In the words of F. G. Coburn, naval constructor in charge of the work, "The steam-hammer process seemed to be good, but it was mystifying, indeed, to see apparently perfect chain snap off under test like cast iron. It seemed as if an addition to the process was needed, rather than a change; and heat treatment suggested itself."

The various operations involved in the process of power-forging chain are briefly as follows: Shearing, scarfing, bending, welding, trimming, studding, heat treatment, proofing and painting. A bar of round stock is rolled from the storage skids on to rollers which guide it through the shears and against the stop which gages the length of the bolts. After cutting off, the bolts are packed in special baskets for transfer by crane to the scarfing furnace.

Scarfing

One end of the bolt is heated in a special oil furnace for a distance of about a foot, and the end is then bent and upset by a single operation in the upsetting machine. During the same heat the bolt is scarfed under a 2,500-pound steam drop hammer, using special steel dies. The flash or web is then removed by a trimming press. The operation is repeated for the other end and the bars are packed in baskets for transport to the bending-machine furnace. The scarfed link is heated throughout to about 1,100 degrees Cent. in a special oil furnace, from which it is swung by a special jib crane to the hydraulic bending press. Here it is bent by wrapping it around a mandrel having the shape of the inside of the chain link. This operation leaves the links practically closed, and it is necessary to pry the scarfs apart with a crowbar in order to thread the links in the chain.

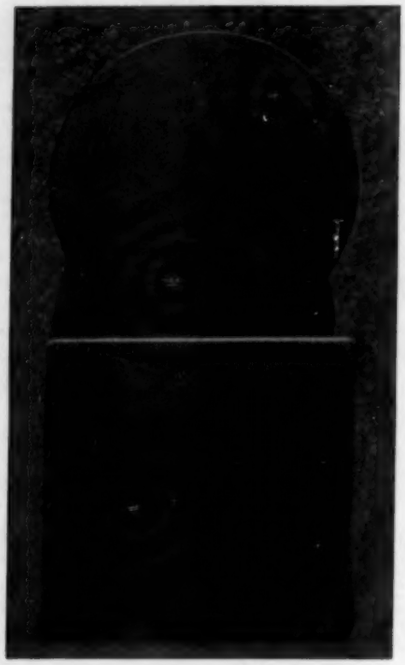


FIG. 1 — SECTION OF BURDEN IRON ETCHED 30 MINUTES

For welding, the link is first preheated, threaded into the end of the growing chain, and the scarfs closed under a heavy hammer. It is then brought to a welding heat of about 1,350 degrees Cent. in a special oil-burning chain forge and welded on special dolly dies under a light hammer. To give the link the proper shape it is brought to welding heat a second time and finished in the dies of a heavy hammer. The last welding process leaves a drop-forge flash inside and outside on the welded end of the link, which is trimmed off by hand.

The drop-forged chain stud, which is inserted to preserve the shape of the link, increase the strength and prevent kinking of the chain, is held in place with the link on its side under the steam hammer and pinched in place by a light blow of the hammer.

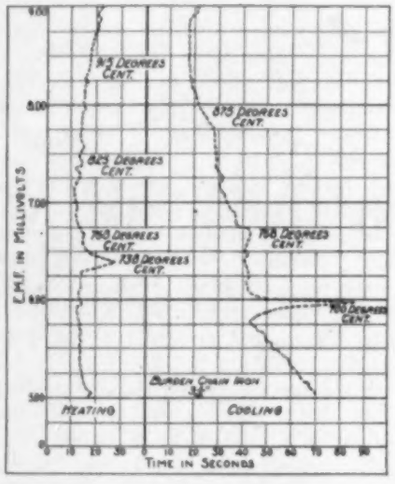


FIG. 2—TYPICAL HEATING AND COOLING CURVES FOR BURDEN IRON

Heat Treatment

Heat treatment is accomplished by loading the chain on to a steel flat car, which is run into a long annealing furnace fired by oil burners. The temperature is brought evenly to about 950 degrees Cent., well above the upper critical point, as determined by the indications of nine base-metal thermo-couples distributed about the furnace, one couple being placed in a bolt of iron under the pile of chain on the car. After the desired temperature has been maintained for 10 minutes the car is hauled out of the furnace, and the chain allowed to cool in the air before proofing.

Each shot of chain is given a proof test with the hydraulic testing machine up to values given in the chain tables. After proofing, each link of the shot is examined for defects, and if unsatisfactory links are found, they are cut out and replaced by the repair crews. In addition to the proof test, a breaking test is made on a "doublet" taken at random during the making of each shot. If this does not equal the tabulated standard others are tried on each side, and if they fail, the whole shot is condemned. The proofing load is approximately 60 per cent of the breaking load. The tables of stresses are standard with the United States navy department, being based on both foreign and domestic practice.

Shots, which have been proofed and found satisfactory, are coated by

From a paper presented at the annual meeting of the American Society of Mechanical Engineers, New York, December, 1916. The authors are assistant naval constructors, United States navy.

hauling through a hot bath of asphalt paint and are then stowed away for shipment.

At present the iron used for the most important sizes of chain is made by the Burden Iron Co., Troy, N. Y. The United States government requires grade *"A"* American refined iron, puddled from all-ore pig iron, free from admixture of steel or scrap; phosphorus not to exceed 0.10 per cent and sulphur not to exceed 0.015 per cent. Chemical analysis of Burden iron, made by the chemical laboratory of the Boston navy yard from borings taken from several stock bars, gave the following average results: Carbon, 0.10 per cent; silicon, 0.10 per cent; phosphorus, 0.085 per cent, and sulphur, 0.008 per cent.

Charpy impact tests of eight specimens averaged as follows, and indicate the difference of resistance to shock due to the direction of the slag fibers: Longitudinal, 150 foot-pounds per square inch, and transverse 39 foot-pounds, per square inch. The high carbon content and of low carbon is frequently very sharp.

The thermal analysis of the iron, or the determination of its critical points, is quite necessary for an intelligent study of its heat treatment. In Fig. 2 are typical heating and cooling curves for Burden iron, which indicate the positions of the critical points. In the heating curve, which is the important curve in connection with heat treating, the indication of the upper critical point, A_3, is indistinct and, at first glance, apparently indeterminate. But the small point shown at 915 degrees Cent. was duplicated in size, shape and position on all of the curves taken, as were also the indications of changes shown by irregularities of the curve from about 825 degrees Cent. up to 915 degrees Cent. It may, therefore, be concluded that the upper critical point is not sharp but extends over the range indicated, with a well-defined end at 915 degrees Cent. This phenomenon is explained by the unequal distribution of the carbon in the iron, different parts of which vary in composition from pure wrought iron to 0.2 per cent carbon, as was determined by metallographic examination. The second and lower critical points are well defined at the temperature indicated. The practical conclusion from the location of the upper end of the upper critical range on the heating curve at 915 degrees Cent. is that to anneal or air-quench the chain from above the critical range it should be heated to about 950 degrees Cent., or about 56 millivolts on the furnace thermo-couples, instead of 52 millivolts, or 890 degrees Cent., as has previously been the practice in the manufacture of wrought iron chain at the navy yard.

A preliminary study of heat treatment was made in the laboratory for the purpose of securing an indication of the best treatment to be used in the actual manufacture of the chain cable, and the effects of the following variables were studied: Maximum temperature of annealing; rate of cooling, or quenching; drawing to different temperatures after heating to maximum temperatures, or after different rates of cooling; and time of annealing, or time material is held at maximum temperature. Each charge consisted of three tensile specimens and two blocks from which four longitudinal and four transverse Charpy specimens were machined. The furnace was heated to about 750 degrees Cent. before specimens were introduced. The temperature was then raised, rapidly at first and slower as the upper limit was approached, to the point where the increase was about five degrees in 15 minutes.

After the specimens had received their heat treatments as outlined, the following tensile and impact tests were made upon the heat-treated specimens: Tensile tests giving yield point, breaking stress, per cent elongation in 2 inches, and per cent reduction in area from 0.20 square inches; and impact tests giving resistance to shock in foot-pounds per square inch of an area of about 0.0785 square inch in a bar 10 millimeters square by 55 millimeters long, with 40 millimeters between supports. All tensile results were within 10 per

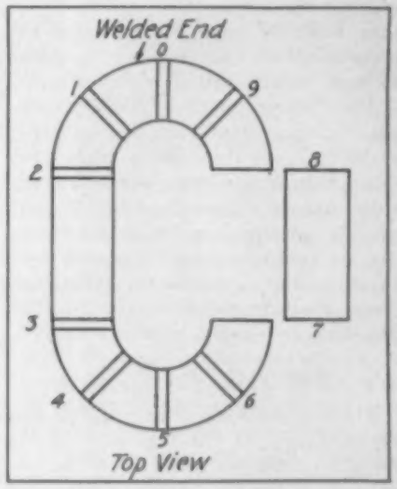


FIG. 3—LOCATION OF TEST SPECIMENS IN LINK

Table I.

Test of Unannealed and Annealed Links

	Average Results—Link No. 1.	Average Results—Link No. 2.	Average Results—Stock material.
Yield point, pounds per square inch	27,900	26,600	26,100
Tensile strength, pounds per square inch	47,600	45,500	49,000
Elongation, per cent	37	38	36
Reduction of area, per cent	51	55	50
Charpy tests, foot-pounds per square inch:			
Longitudinal, quarter	85	122	39
Longitudinal, side	90	176	
Transverse, quarter	48	41	150
Transverse, side	41	52	

appearance of the transverse and longitudinal sections of a stock bar, when polished and etched, is shown in Fig. 1, which brings out clearly the outlines of the different bars and slabs, known as grade *"B"* bars, which were piled together to make up the finished grade *"A"* bars. Also each grade *"B"* bar is seen to be made up of well-defined areas of different shades or depths of color, representing the muck bars from which it was rolled.

Under the microscope the heavily shaded areas have a pearlite and ferrite structure, with numerous slag spots showing them to be wrought iron with about 0.20 per cent carbon. The more lightly shaded areas indicate less pearlite, typical of about 0.05 per cent carbon, and the unshaded areas a pure wrought-iron structure. Metallographic examination was made of specimens cut from three stock bars all of which displayed the same characteristics of segregated carbon; the line between adjacent areas of

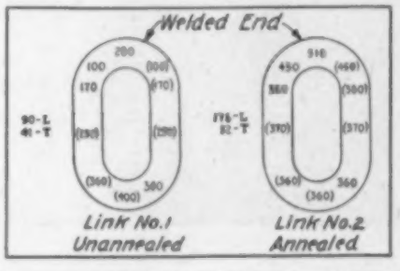


FIG. 4—GRAINS PER SQUARE MILLIMETER AT VARIOUS SECTIONS OF LINKS

cent of the average results from the three tensile specimens previously mentioned as having been subjected to heat treatments in each series.

The Charpy impact results varied greatly, in certain instances as much as 80 per cent from the average. For example, one specimen showed a fine, silky fibrous fracture with 321 foot-pounds per square inch resistance, and the next specimen, supposedly from the same bar, a coarse crystalline and dirty fracture with only 39 foot-pounds per square inch resistance.

Results of Physical Tests

These variations are probably due to variations in the character of the metal in different sections of the bar, as shown by the metallographic examination. It would be possible even for adjacent specimens to have widely different characteristics, and the probability of this is enhanced by the fact that the breaking sectional area of a Charpy specimen is only about 0.0785 square inch.

As a general conclusion from the results of the physical tests, it may be stated that the iron is affected by heat treatment in a manner very similar to low-carbon steel, giving an increase of 40 per cent in the tensile strength and 125 per cent in the longitudinal impact strength when heated to 950 degrees Cent. and quenched in water. This was confirmed by microphotographs showing sorbitic and martensitic structure typical of the hardening structure of mild steel. It is therefore recommended that a further investigation be made of the effect of this heat treatment and the practicability of its application to the manufacture of chain cable. It was suspected that the length of time during which the specimens remained at maximum temperature in the furnace might have some effect on the results, so a special series of heat

FIG. 5—LINK 1, WELDED END. FERRITE WITH TRACES OF PEARLITE, LARGE GRAIN SIZE, AND SLIGHT DISTORTION

treatments were run at 970 degrees Cent. and maintained at that temperature for intervals of 1 minute, 15 minutes, 30 minutes and 2 hours. The results indicated that on specimens of that size the duration of the time of annealing has no appreciable effect.

Two preliminary experiments were performed with full-size chain, to confirm the results of the laboratory experiments as to the best temperature to which the chain should be heated for annealing by air cooling, and to determine the best sequence of annealing and proofing. It was concluded both from the investigation of the stock material and the laboratory experiments on this subject that the chain should be annealed from about 950 degrees Cent., or 56 millivolts, instead of 890 degrees Cent., or 52 millivolts, as hitherto had been the practice. To confirm this conclusion, 2⅝-inch Burden iron

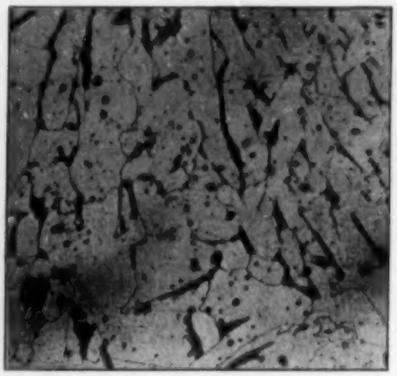


FIG. 6 — LINK 1, WELDED QUARTER, FERRITE AND PEARLITE, MEDIUM GRAIN SIZE, AND MARKED DISTORTION

doublets were heated to temperatures corresponding to 48, 52, 56 and 60 millivolts. The tensile results from the specimens heated to 52, 56 and 60 millivolts were not conclusive, but the fractures of the 56 and 60-millivolt links, however, were, as a whole, very clean, fine and silky, and much better looking than those of the other links, and the practice has therefore been followed in the manufacture of the chain, of annealing from approximately 950 degrees Cent., or 56 millivolts, with the result that stronger chain has been produced, as determined by the routine test doublets. The second series of tests, to determine the best order to follow in annealing and proofing, was conducted with 2⅝-inch Burden-iron doublets. Chain may be annealed before proofing, which is the regular practice, annealed after proofing, or annealed before and after. When

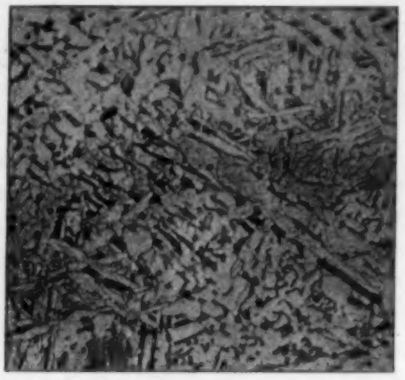


FIG. 7 — LINK 1, WELDED QUARTER. FERRITE AND PEARLITE, 0.15 PER CENT CARBON. MEDIUM GRAIN SIZE, MARKED DISTORTION

chain is proofed it is strained well over the elastic limit of the link as a whole. For example, 3¼-inch test links are proofed to 367,000 pounds, which leaves a permanent set of about ⅜ inch. The ratio of proof to pulling load is 367,000: 620,000 = 0.59, while the ratio of elastic limit to ultimate stress of the material is 27,000:49,000 = 0.55.

Proofing, therefore, strains certain parts of the link above the elastic limit and leaves it in an internally strained condition. If the chain is annealed before proofing the chain leaves the shop for service with internal strains, if the chain is annealed after proofing, the internal strains of proofing are relieved by annealing, and from this consideration alone each link should be stronger.

The latter method appeared to produce the stronger link. On the other hand, it must be noted that four of the six test doublets of this method broke by failure of the weld before they were strained to their breaking stress. One of the best men in the shop forged all of the links for this experiment, knowing that they were for experimental purposes. This, combined with the fact that there was only one failure of the weld in the tests made for each of the other methods, indicates that the failure of these four welds was due to the sequence of operations.

Annealing Before Proofing

The logical explanation is that when a link is proofed before it is annealed there is a tendency to start an opening in the weld due to local strains which may have been produced by forging. Then when the link is subjected to an applied load it will break through the weld before the breaking stress of the material is reached. If the link is annealed before proofing, this condition will be relieved. After

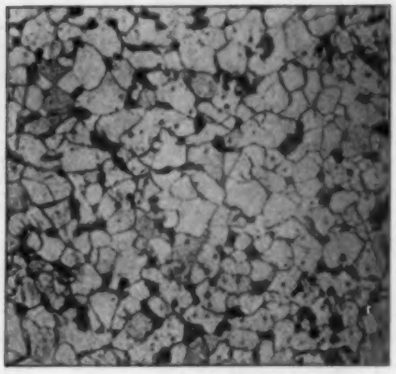


FIG. 8 — LINK 2, WELDED QUARTER. FERRITE AND PEARLITE, 0.1 PER CENT CARBON. VERY SMALL GRAIN SIZE

four of the six doublets broke through the weld, it was decided to run another series of tests on this method, for which purpose eight 2¾-inch doublets were used. Of these, two broke low with a dull, lusterless fracture, indicating overheating. The average of the other six was 504,000 pounds, failing generally across the welded quarter with a fibrous fracture. In spite of the careful welding, the point of the scarf in one link was found not welded when pulled to destruction.

These results were compared with results from tests on 2¾-inch doublets annealed and pulled in the course of regular shop manufacture. These doublets were treated by first annealing and then proofing. The average pulling strength of six of these links was 482,000 pounds, which, compared with the 504,000 pounds of the links treated by the other method, shows that the latter process produces the stronger links, provided there is no injury to the weld due to the action of proofing on local strains.

Because this tendency to injure the weld does exist where the latter method is used, the conclusion was reached that the method of annealing before proofing should be followed.

Welding and Annealing

In order to explain the failure of these power-forged, unannealed links and the way in which annealing restored their strength, it is important to understand the essential differences between hand and power forging. The use of the steam hammer in forging enables a much greater reduction in area to be made at the weld, and hence produces a much greater amount of internal work. It also permits the use of a longer scarf, which necessitates a welding heat further around on the quarter of the link. In power forging, therefore, the link is brought up to a white heat around on the quarter, and then shades off through light orange, dark orange, and bright red, to a dull red at the bent end. In hand forging the white heat does not cover so large an area and shades down to a dull red on the side of the link, and to black on the bent quarters and end.

It would be expected that these conditions would permit a greater crystal growth of the power-forged chain, except under the hammer at the welded end. Since the welded end of the power-forged link receives a much greater amount of work from hammering, it should have a much smaller grain size than the hand-welded link at the finishing temperature. On the other hand, the power-forged link has a greater cooling range during which the crystals may grow, since its finishing temperature is higher; but most probably this effect is small in comparison with that of hammering. The net results should be an appreciably smaller grain size at the weld of the power-forged link.

In comparison with the other parts

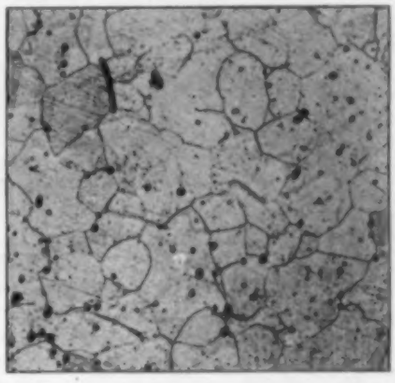


FIG. 9—LINK 2, WELDED END. FERRITE STRUCTURE, MEDIUM GRAIN SIZE

of the same link, the grain size at the weld should increase from the middle to the end of the weld as the hammering effect decreases, and then should decrease from the weld around to the bend and in proportion to the maximum temperature to which the part was heated. Hammering also deforms the crystals at the weld, but this effect should be obliterated by the crystal growth during cooling from 1,200 degrees Cent. down through the critical range, after hammering has ceased, and there should be no resultant strain hardening.

The effect of the carbon content should further be considered. Above the critical range, carbon is present in a solid solution of iron, or austenite. As the metal after forging cools slowly in air through the critical range, all the carbon should separate freely from the austenite crystals in the form of pearlite. Therefore, carbon should have little hardening effect in either hand-forged or power-forged chains; and, since there is no practical difference between the cooling conditions of the two, it should cause no difference between them in hardening.

Hand Versus Power Forging

The only remaining difference between the structures of the hand-forged and power-forged links, which could cause the greater stiffness of the latter, is in the grain size. In the side of the link where most of the stretching takes place, the grain size is probably somewhat greater in the power-forged link, while in the welded quarter, where the first power-forged links broke, the difference is probably not appreciable. According to Rosenhain, coarse structure generally does not affect tensile strength or ductility to a marked degree, although it does greatly decrease resistance to shock.

Therefore, from a theoretical consideration of the material as an alloy of iron and carbon only, we can find no apparent cause for stiffness in the power-forging process. In the tests which are hereafter described, however, it developed that in the power-forged link there was an overheated, distorted structure, which was relieved by the recrystallization in annealing. The stiffness of the link was undoubtedly removed primarily by relieving this condition, but also to some extent by the lessened hardening effect of carbon and the refinement of grain size caused by annealing.

For the purpose of testing, a shot of five 3¼-inch Burden iron links was forged in the regular manner and four of these were annealed. Specimens were cut from the unannealed link, designated as No. 1, and from one of the annealed links, designated as No. 2. The remaining three links were pulled. Ten sections were located around links Nos. 1 and 2, as shown in Fig. 3. Piece 7-8 was used for tensile specimens and Charpy

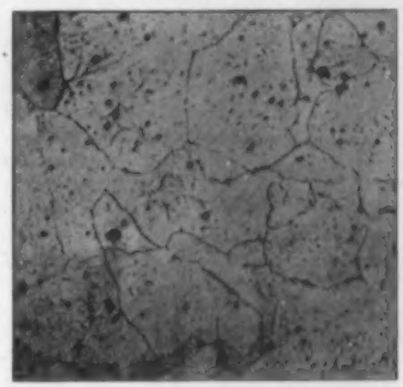


FIG. 10—LINK 2, WELDED QUARTER. FERRITE STRUCTURE, VERY LARGE GRAIN SIZE

specimens were cut from the straight section 2-3 and from the curved section 0-1. A slice ¾ inch thick was cut from each of sections 0 to 6, and from 9, for metallographic examination. Eight specimens ¾ x ¾ x ½ inch were cut from each of these slices, numbered from 1 to 8, and their faces polished as required.

The results of the physical tests of the specimens are given in Table 1. In the third column are entered for comparison the results of tests on untreated stock material previously given. However, only a rough comparison can be made between these results and those from link 1, for the reason that in the link specimens there is a curvature of the slag grain with respect to the axes of the specimens, due to the curvature of the link. This curvature probably renders of no significance any difference under 10 per cent. The only marked difference is in the longitudinal Charpy tests, which gave results 45 per cent lower in the case of those cut from the side of the link, due to a combination of the effects of carbon and overheating in addition to curvature. The longitudinal specimens from the quarter gave somewhat lower results than those from the side, due to the effects of greater overheating, greater grain curvature, and larger grain size. The results of transverse specimens, as shown by the laboratory heat treatments, are generally contradictory and unreliable, and are therefore neglected.

In comparing the results of links No. 1 and No. 2, the question of curvature is, of course, eliminated, as the specimens from both links were in the same condition. Link No. 2 gives a small decrease in yield point and strength, and a small increase in ductility, which shows that annealing in air has lessened the hardening effects of carbon. Although annealing has also relieved the overheated condition and refined the grain size, these conditions do not have an appreciable effect in increasing the strength as shown by static tests.

In link No. 2 the longitudinal Charpy tests, side and quarter, were increased respectively from 90 to 176 foot-pounds per square inch, and from 85 to 122 foot-pounds per square inch, showing that annealing has greatly increased the resistance of the metal to shock, due mostly to relieving the overheated condition and refining the grain size, which have a decided effect on ability to resist shock.

The foregoing tests lead to the conclusion that the present heat treatment of cooling in air slightly decreases the yield point and tensile strength, increases the ductility, and greatly increases the resistance to shock of the metal of the forged link.

In Fig. 4 are sketches of links Nos. 1 and 2, showing the grain size at the various sections. The determinations are indicated to the closest ten, without parentheses. The other figures, in parentheses, were obtained by induction as follows:

Since both sides of the links are in the same condition by similarity, section No. 9 should be the same as section No. 1, No. 8 the same as No. 2, and No. 4 the same as No. 6, and they are so indicated. The middle of the side of the link should have a grain size about half way between that of the welded and bent quarters, or about 250 grains per square millimeter for link No. 1, and 370 grains per square millimeter for link No. 2. From the decrease in grain size toward the bent end of link No. 1, its grain size at the bent end is probably about 400 grains per square millimeter.

Grain Size of Welded Metal

In link No. 1 the grain size is fairly small right at the middle of the weld, but increases rapidly toward the quarter, since the effect of hammering on crystal growth then decreases faster than the effect of heating. But from the welded quarter to the bent end the grain size decreases again; since there has been no hammering and the temperature resulting from heating the link decreases as the distance from the weld.

Comparing link No. 1 with link No. 2, it is seen that annealing has the effect of refining the grain size of the link, especially at the welded end. This gradation to a smaller grain size at the welded end shows that some effect from the smaller grains in that part before annealing still remains to produce a somewhat smaller grain after annealing, in spite of recrystallization.

Structure of Unannealed Link

A microscopic study was made of the structure of the metal and its variation in different sections, and for this purpose both transverse and longitudinal faces of specimens from all parts of each link were examined. In no section of link No. 1 is the carbon distributed homegeneously; it appears in segregated areas, except that near the boundaries of such areas the carbon has become somewhat diffused into the neighboring ferrite areas due to the various heats which the link had received during manufacture. The proportion of pearlite areas containing greater than 0.05 per cent carbon in different specimens varies from about 15 per cent to about 50 per cent, the average being about 30 per cent.

Typical areas from the welded end containing varying percentages of carbon are shown by Figs. 5, 6 and 7.

In the annealed link the same unhomogeneous distribution of carbon was found, as would be expected. Around the welded end, however, pearlite areas were relatively fewer than in link No. 1; other parts of the link were about the same as link No. 1. The possibility of this nonuniformity between the two links should have been avoided by insuring that both links were made out of the same bar, but the difference was not appreciable enough to affect any of the general conclusions which might be drawn from the experiment.

Typical areas from this link, with varying percentages of carbon, are shown by Figs. 8, 9 and 10. The important point brought out is that there are no signs of distorted structure in any part of the link. The pearlite has separated and segregated around equiaxed grains in the normal manner.

From the foregoing examination, the conclusion is reached that the stiffness of the unannealed link is largely due to the overheated distorted structure in the welded end. The fact that the metal of the forged link does not return to its normal condition during slow cooling after forging, even if it has been overheated to 1,350 degrees Cent., is probably to a large extent due to the effects of slag and other impurities. Annealing relieves this condition by the process of recrystallization, which practically wipes out all former structure and gives a finer and more normal grain size.

In regard to this overheating, Rosenhain says; . . . "We find that by 'overheating' steel, *i. e.*, by exposing it to unduly high temperatures, or for too long a time at any temperature above Ac_3, the growth of a very coarse iron structure results, and this, on cooling down, gives rise to a corresponding coarse ferrite-pearlite structure. Not only this, but the arrangement and forms assumed by the pearlite which is formed from such steel is characteristic; there is a strong tendency for the ferrite to take the form of straight bands with elongated and angular patches of pearlite between them, the ferrite bands frequently crossing one another, at angles of 60 degrees. The most typical feature, however, is a decided drop in the yield point as compared with that of the same material in a more normal condition."

The above description fits exactly the structure which has been found in the carbon areas of the welded end of the unannealed link. In the results of the physical tests, it was seen that the shock-resisting quality of this link was actually low, but it appears that the tensile strength and elongation are not "quite satisfactory" as indicated in the foregoing quotation.

Emphasize Advance in Drop Forging

Fourth Annual Meeting of Manufacturers and Supplymen at Cleveland Gives Evidence of Growing Importance of Drop Forge Industry—Technical Papers of High Merit Feature Program

ENTHUSIASM was the keynote of the fourth annual convention of the American Drop Forge association and the second annual convention of the Drop Forge Supply association, held at the Statler hotel, Cleveland, Thursday, Friday and Saturday of last week. Not only were the meetings better attended than ever before, 211 members having registered, as against 114 last year, but the technical papers were of more timely importance than those presented in past years. A resolution offering the services of the American Drop Forge association as a unit to the government was carried. At the opening session Thursday morning Charles E. Adams, president, Cleveland Hardware Co., Cleveland, welcomed out-of-town members of the association to Cleveland, the foremost city of the drop forge industry. R. T. Herdegen, Dominion Forging & Stamping Co., Walkerville, Ont., and president of the American Drop Forge association, presented his annual address. Mr. Herdegen emphasized the importance of drop forge men preparing for future conditions. He advised members to accept all the war business which they could handle and urged them to conform rigidly to all government specifications. He cautioned manufacturers of forgings to be sure that they thoroughly "understand what they are able to furnish and not delude themselves into the belief that because the government allows them to conform to the specifications in a loose manner for the first month or two, it will continue to allow them to do so." With reference to the present high prices of drop forgings, Mr. Herdegen said, "Prices are stupendously high. We must take careful stock of ourselves. We do not want to get careless because things are easy with us now. We must not fool ourselves with the idea that the present system is all right and will remain so. A drop in prices will find us unprepared.

OFFICERS AND DIRECTORS OF AMERICAN DROP FORGE ASSOCIATION

Upper Row: George Desautels, E. B. Horne, T. W. Siemon

Lower Row: E. J. Frost, S. H. Carpenter, R. T. Herdegen, J. F. Zwicker, F. A. Ingalls

In the Thursday afternoon session, E. J. Frost, Frost Gear & Forge Co., Jackson, Mich., read a paper on "Standardization of Finish on Forgings". An abstract of this paper appears on page 1352. The author recommended that a committee be appointed on standardization of designs and drawing to formulate a working code of forging practice, if possible introducing a set of symbols to accurately define quality of surface required and methods to be employed in machining. It was also suggested that drop forgers refuse to work from blueprints which do not reasonably conform to the code. A committee was appointed to act on the suggestions.

D. M. Motherwell, Western Drop Forge Co., Marion, Ind., delivered a paper entitled, "Schedule Board in the Forge Plant," describing an ingenious system of cards which show at a glance the amount of work that has been accomplished on any forging job. The schedule board is spaced, lettered and provided with screw hooks to hold cards containing information relative to orders, including name of customer, date of order, order number, die number, name of part, when wanted, etc. These cards are checked up from a daily forging or inspection report, which shows the result of inspection of hammer work. Quantities of work performed are marked opposite the date on the card. By this method every operation on a piece as it progresses through the plant is followed by the card on the schedule board.

"Safety in the Forge Shop," presented by J. E. Williams, Pennsylvania Forge Co., Philadelphia, attracted considerable discussion. It is a significant fact that although forge men are striving to attain maximum outputs, they are nevertheless constantly experimenting with new safety devices. This was demonstrated in the discussion following the paper when forge men who had been unsuccessful in employing safety devices on certain machines, explained their difficulties and asked advice from other men who had found successful solutions to the problems.

President R. T. Herdegen presented a paper on the "Hammer-Hour System of Overhead." He described a system of computing overhead expenses whereby the overhead costs are entirely divorced from those of production. This is a departure from the method of adding the productive labor, in one column and the overhead or unproductive in another, adding them up and determining a ratio. The system developed by Mr. Herdegen has been installed in the plant of the Dominion Forging & Stamping Co., Walkerville, Ont. After considering such factors as cost of buildings, maintenance, equipment, insurance, power, unproductive labor, etc., the cost of overhead is distributed among the different machines and furnaces. For instance, if the overhead cost of running a large hammer is $5 an hour and the hammer turned out 100 pieces in an hour, the burden chargeable to each forging would be 5 cents. The use of this system in distributing indirect expense is said to facilitate the final computation of costs.

F. A. Ingalls, Ingalls-Shepard Forging Co., Harvey, Ill., emphasized the need of a uniform system of cost accounting as follows:

"I don't suppose anyone ever quoted a price so low that he could not afford to do the work on that basis, except on a more or less hazy theory that it might be a secret transaction and not become known. Usually the buyer is philanthropic enough to advise the competitor of the fact, and that he must awake and get

Cleveland Forger Urges Labor Economy

C. E. Adams, president, Cleveland Hardware Co., commented on after-war conditions, saying that "We must make up our minds that we are going to face the same conditions that we were under before the war. There are 15,000,000 men in this war and their places have been filled all over the world by women and boys, who have never been in industry before. Some day 15,000,000 men will come back into this world of industry and want their jobs again. As manufacturers, we must think of these things, and we are here now to plan economies and to cheapen labor; not to get labor for less per hour, but to do with less labor by means of machinery. We must have the machines to do two men's work that did one man's work before or do three men's work that did one man's work before."

his cost down or be considered an inferior source of supply. These seeds of unreasonable low prices, which are supposed to be sown in the darkness of secrecy, invariably develop into sorry looking affairs in the daylight of publicity. Each manufacturer should make an effort to see that none of his customers can get a poor forging from his shop and that no one can get any forgings in that shop without paying a price that insures a fair profit."

Bonus System in Buick Plant

The "Bonus System Applied to Die Sinking," was the subject of a paper presented Friday morning by A. A. Motherwell, Buick Motor Car Co., Flint, Mich. The bonus system, according to Mr. Motherwell, has produced extremely gratifying results. Continuing on the subject, he said:

"One set of axles was finished complete in 49½ hours for which we paid $108 in day rate and bonus. When this job was done on a day work basis it averaged 340 hours and cost $204. Many jobs are being done in one-fifth the time formerly consumed and the die sinkers are still maintaining a high quality of workmanship as the work is checked up closely and no flaws of any sort or careless finish is passed. Since the introduction of the bonus system, the efficiency of the die shop as far as production is concerned has been increased about 300 per cent."

"Pickling and the Pickling Department," a paper presented by J. H. Snyder, Mesta Machine Co., Pittsburgh, is abstracted on page 1353, under the title, "Modern Pickling Practice."

Other papers presented were: "Contracts and Credits," T. W. Siemon, Union Switch & Signal Co., Swissvale, Pa.; "Methods and Machinery for Upsetting Work," E. R. Frost, National Machinery Co., Tiffin, O.; "Application of Clean Producer Gas in Drop Forging," Arthur L. Stevens, Chicago, Ill.; "Heat Treatment of Forgings," James H. Herron, president Cleveland Engineering society, Cleveland.

Officers for the ensuing year are: President, R. T. Herdegen, Dominion Stamping & Forging Co., Walkerville, Ont.; vice president, S. H. Carpenter, Atlas Drop Forge Co., Lansing, Mich.; secretary and treasurer, E. B. Horne, Packard Motor Car Co., Detroit. Directors are George Desautels, Imperial Drop Forge Co., Indianapolis; J. F. Zwicker, Willys-Overland Co., Toledo, O.; E. J. Frost, Frost Gear & Forge Co., Jackson, Mich.; F. A. Ingalls, Ingalls, Shepard Forging Co., Harvey, Ill., and J. F. Connelly, Champion Machine & Forging Co., Cleveland.

Officers for the Drop Forge Supply association are: President, H. N. Taylor, N. & G. Taylor Co., Philadelphia; vice president, Charles Harmon Jr., National Machinery Co., Tiffin, O.; secretary and treasurer, A. L. Wurstor, Heppenstall Forge & Knife Co., Philadelphia.

Banquets were held at the Statler hotel Thursday and Friday evenings. Saturday morning the members of both the American Drop Forge association and the Drop Forge Supply association were guests of the Cleveland Hardware Co.

Specifications For Forgings

BY E. J. FROST

USUALLY the average purchasing agent selects the lowest bid, ignorant of the fact that possibly the highest price quoted would have saved several times the difference in the machining cost. It is looking toward standardization of drawings as well as in their interpretations that I have directed most of my thoughts.

Drop forgers should be called in for consultation and advice when new designs are being worked out, or at least preliminary drawings or sketches should be sent to prospective sources of supply to get constructive suggestions and to avoid the revising of completed designs and details. Many drop forgers are more than willing to render their service for their regular customers, if not for the trade at large, and in many instances the saving has been enormous.

In the case of the large automobile forgings, such as axles, crankshafts, camshafts and the like, tolerances and amounts for finish should be established within the practice of a well-organized forge shop, and it should be understood that any requirements beyond this will call for a corresponding increase in price. Extra thin ribs or webs which cool too rapidly in the dies, thus necessitating reheating or causing folds or cold-shuts should be cause for an increase in price. In the case of axles, the method to be employed in machining has much to do with the accuracy of forgings required and especially to the relative accuracy of the various parts. The tendency the last few years has been to compel the drop forgers to produce an axle of such refinement that the machining cost will be brought to the lowest possible amount. This would be fair enough if the price were commensurate with the extra care and work entailed, but with the return to normal business conditions, I fear we may have a return to the old competitive methods so disastrous to peace of mind and condition of pocketbook.

An overall tolerance of ⅛ inch should be as close as is required from king bolt to king bolt center, although some axle manufacturers are demanding 1/16 inch. This is hard to maintain through the heat treating, especially in the composition if the steel varies much.

An understanding should be had at the time of bidding on the work as to whether the flat surfaces on the spring pads for the U-bolt nuts are to be put in padding or are to be afterwards machined.

In regard to twist in an axle, some purchasers are requiring that the yokes come absolutely to gage, but I believe this practice is unfair unless an additional price is paid. At least 1/32 inch on the king bolt center should be allowed for distortion.

The yokes should have a limit from 1/16 to 3/32 inch on each surface for finish plus the necessary forging draft. Restriking of the spring-pads in order to conform to the curvature of the springs should be specified on drawings if wanted.

Stock for Finishing

When we come back to the crankshaft, there are such vagaries in the design that it is extremely hard to make definition, but, generally speaking, there should be more stock on the cheeks where finished as it is impossible to allow but 1/16 inch, as is sometimes asked, and still be sure of cleaning up in the machining. This is especially true of some alloy steels. Frequently drawings show a rectangular section for that portion of a crankshaft connecting the shaft with the wristpin. This should be stopped and the drawings should show the forging draft and also indicate finish

if required. Where flanges are wanted on a crank it naturally will be necessary to have draft as produced in the hammer, and this should be considered in the design. If the flange is large and must be made on the upsetter, side draft would not be necessary, but the expense of the extra heat should be considered.

It is bad practice to attempt to thread rough forgings, but the fact remains that some customers require it, and in one specific instance in our shop, compelled us to make new dies because we had allowed stock for machining before threading, and this in the face of the fact that the drawings did not specify the method to be used. Drop forge manufacturers should require their customers to furnish assembly drawings where there is liable to be interference of unfinished surfaces. One case in point is that of a wheel hub where an unfinished surface came very close to a pressed metal cap and a better understanding of the requirements allowed us to get from 1500 to 2000 more forgings from the dies before resinking, without detriment to the product.

Modern Pickling Practice

BY J. H. SNYDER

MECHANICALLY speaking, the term "pickling" is applied to the method of dipping metal objects into acid solutions, thus ridding the surfaces of oxide, scale, sand or any other foreign material by means of chemical action. Pickling constitutes a very important step in galvanizing, tinning, enameling or electroplating in plants that market tinplate, sheets, wire, plates, stampings, drop forgings, cold-rolled ware, enameled ware, castings, etc.

Hand pickling is the simplest and crudest means of treating material. A company with a limited output and some of the larger companies possessing little or no knowledge of pickling, generally follow the lines of least resistance and clean by hand. A number of vats are distributed over the pickling room, containing the necessary acid solution, manual labor being used to carry the material to and from the cleaning-room department as well as from one vat to another.

Machinery Conserves Labor

Conveying machinery, trucks, cars, cranes, etc., have recently replaced manual labor where increased production demands it, and only a small percentage of the companies now have laborers carrying the material to the pickling room. Electric hoists, air hoists and jib cranes have been installed to assist the men in replacing the material in and taking it out of the vats, as well as shifting it in the acid solutions occasionally in order to obtain better results in cleaning. In many cases, large electric cranes are used to shift the material in the vats in order not to have one part of the object overpickled and another part insufficiently pickled. This method is now being used in several plants with more or less favor. It is found, however, that while labor is reduced, yet the acid fumes constantly rise and come in contact with the electrical apparatus causing an increase in the costs of operation. Moreover, the objects being pickled are allowed to lie motionless nearly all the time in the acid solution. This increases the cost of pickling.

Pickling machines are designed to take the place of electric cranes and reduce the labor required in the pickling operation. A machine that has met with considerable favor in pickling plants is one which agitates the material as well as the acid by moving the load up and down through the different solutions. The machine referred to is one manufactured by Mesta Machine Co., Pittsburgh, and is operated by steam or air from a central plunger which carries a number of horizontal arms from which are suspended acid proof crates. The action of steam or air in the cylinder at the end of the downstroke of the plunger causes a snap which tends to separate and shift the material being pickled in such a way as to remove the sand or scale, scour the material and thus mechanically aid the chemical action of the acid.

Acids used for pickling are sulphuric, muriatic, hydrochloric or hydroflouric. Sulphuric acid 60 degrees and 66 degrees Baume is most generally used in this country, principally on account of the ease of transporting large quantities in tank cars and its comparatively low cost. Many companies change completely the sulphuric acid solution every 24 hours in the following manner: When the work is commenced in the morning a solution, say, 8 per cent sulphuric acid by volume, is put in the vat; the proper amount of water is mixed with the acid and throughout the day sufficient acid is added to keep the necessary strength.

Where the material to be pickled is covered with oil or grease, potash solutions are used to clean the surfaces. Potash is very expensive at the present time and a substitute known as Wyandotte cleanser is used. It is claimed that as high as 50 per cent sulphuric acid is saved in the proper cleaning of the materials preparatory to the acid bath.

Wide Temperature Variation for Acid

The amount of sulphuric acid to a ton of steel pickled varies with the character of material and with the chemical analysis of the acid, and ranges from 50 to 200 pounds. The temperature of the sulphuric acid solution should be kept as near the boiling point as possible. In the various plants throughout the country the temperature varies from 75 degrees Fahr. to 212 degrees Fahr.

The temperature of water vats is a problem which everyone must work out for himself, being governed entirely by the kind of material to be washed. Certain kinds of material require cold water while others require it just as hot as it is possible to make it. For instance, enameled ware is immersed in cold water, while sheets of heavy gages are rinsed in very hot water and allowed to dry from the heat generated. Lighter gage sheets must be put through the drying press because the sections are so thin that the heat passes from it so quickly that it will not dry thoroughly-with the result that the sheet will rust.

In the drop forge industry, pickling, tumbling and sand-blasting are the three principal methods used in the cleaning department. Pickling is the most preferable if the acids and salts are thoroughly washed from the surfaces of the forgings.

Amounts of Sulphuric Acid Required For Pickling

Kind of material	Per cent of acid by volume	Average pickling time in minutes	Method
Tin plate...	2 to 10	6 to 10	machine
	10 to 20	10 to 20	hand
Sheets	4 to 10	8 to 12	machine
	10 to 18	10 to 20	hand
Wire	6 to 12	15 to 30	machine
	10 to 20	25 to 50	hand
Pipe	6 to 8	10 to 15	machine
	8 to 20	20 to 25	hand
Cold rolled.	8 to 10	12 to 15	machine
Steel	10 to 15	20 to 25	hand
Stampings .	8 to 12	15 to 18	machine
Forgings ..	8 to 10	15 to 18	machine
	15 to 20	20 to 30	hand
Enamel ware	10 to 15	15 to 20	machine
Brass	10 to 15	5 to 8	hand
Alloy forg'gs	8 to 10	20 to 30	machine
	8 to 10	30 to 45	hand

Accurate Costs Mean Fair Business

Edward N. Hurley Condemns Guesswork Prices and "Happy Go Lucky" Methods of Management and Predicts Dawn of New Day in Competition, in Efficiency and in Government Co-operation

BY EDWARD N. HURLEY

THE feeling that competition is a bad thing for an industry is not so widespread as it once was. There never was a truer statement made than "Competition is the life of trade". If we did not have competition we could not be salesmen. Without it we would be mere order takers. Competition places on his metal not only the salesman, but also the manufacturer, making him introduce new and novel things in order to lead. This benefits his company, his competitors and the country as a whole.

Any-Old-Way Business Over

We are a new country, and a few years ago we did not have the keen competition at home that we now have, and the necessity for watching the new details of our business was not required. But, gentlemen, the days for "happy-go-lucky" business methods are past. We now have keen competition in our home markets, and we must realize that we are going to have even keener competition in the markets of the world. We must face conditions as they exist.

It is a fact, well understood among business men, that the general demoralization in a large number of industries has been caused by firms who cut prices, not knowing what their goods actually cost to manufacture. The cost of selling, which is equally important, is often almost wholly lost sight of.

Are the officers of the companies and firms who are cutting prices right and left, irrespective of their cost, fair to their customers, their stockholders or their competitors? Quality and service are becoming greater factors in the field of merchandising. Long after the price of a product is forgotten the quality is remembered.

The man who does not know his true cost is the man who prices his goods foolishly, and thereby impairs the business of his sound competitors at the same time that he ruins his own. Too low price making, based on guesswork or on partial cost, is a menace to sound business.

Please understand me; the menace is not in underselling, for a business concern must expect to face the low prices that are due to efficiency. But even the most efficient concern is not always able to meet cut-throat prices based on ignorance.

The fact that hundreds of industries are at the present time without adequate information leads me to urge upon the federal trade commission the importance of comprehensive campaign of education in cost accounting. Before we could obtain the data which we needed so badly in the consideration of business problems, American industry had to have the machinery by which it could furnish the information which we desired.

In a preliminary investigation, I found that, leaving out of consideration the banking, railroad and public utilities corporations, and referring only to those that have to do with trade and industry, there were about 250,000 business corporations in the country. The astonishing thing is, that in 1914, of this number, 100,000 had no net income whatever; 90,000 made less than $5000 a year, while the remaining 60,000—the more successful ones—made $5000 a year and over, and 30,000 of these successful corporations did not charge off one penny for depreciation, and paid taxes to the government on inflated balance sheets.

Turning now from net income to the total volume of business done by the 60,000 successful corporations in the United States, we found that 20,000 made annual sales of less than $100,000; 20,000 more sold goods valued at from $100,000 to $250,000, and 10,000 more from $250,000 to $500,000.

Scope of Big Business Limited

Of the sixty thousand, 5000 ship annually $500,000 to $1,000,000 worth of goods, 4500 corporations have total sales of from $1,000,000 to $5,000,000, while only 462 of these industrial and mercantile corporations in the United States do a business of $5,000,000 or more a year.

These striking figures exhibit a condition which has existed for many years. They show conclusively that big business, while important, constitutes but a small fraction of the trade and industry of the United States. They make clear that there is an unduly large proportion of unsuccessful business concerns.

With an adequate cost accounting system in the industries of this country, the gathering of information would be made comparatively easy, and task of government in its solution of public problems would be greatly simplified. Cost accounting would also be of great benefit to industry itself, and anything which makes industry more intelligent and efficient ultimately benefits the public. A good business man is a more vital asset to a community than a poor one. He employs capital and labor, and increases substantially the wealth of the community.

Scientific cost accounting will have so profound an effect upon our commercial operations that it should be regarded as a movement of far-reaching national importance. I predict that within five years there will be very little money loaned by any banker in the United States to any merchant or manufacturer who does not present a statement showing detailed information not only regarding his true assets and liabilities, but also indicating that he is conducting

Outline Better Business

Two business papers of special interest to the iron and steel industry were included among those presented at the World's Congress of Salesmanship at Detroit recently. One of these was by Edward N. Hurley, formerly chairman of the Federal Trade Commission on "The War and Business." He laid stress on the necessity for and the movement toward true cost accounting in modern business. He made the striking prediction that within five years loans to commercial enterprises largely would be contingent upon the bankers being satisfied that proper methods of cost accounting and efficient management were being pursued. The other address was by Colonel H. P. Bope, vice president and general sales manager of the Carnegie Steel Co., who set forth the Carnegie methods for the sale and distribution of products.

his business in an efficient manner, and that he absolutely knows his true costs.

America is shaking off some business traditions of the past; it is looking for leaders to point the way into a more active participation in the affairs of the world. In the work of building our foreign trade we must lay our foundations secure; we must build below the frost line. We are not building for today or tomorrow, but for the years and the decades to come. Fundamentally, there are two sides to the shield of foreign trading; the one is the efficiency of the American manufacturer at home; the other is co-operation among business men in marketing their goods abroad.

But more efficiency at home is not enough, and it will not bring to American business men that share of foreign trade which they deserve. However efficient we may be in production and in merchandising in our domestic market, we cannot, without co-operation, succeed in selling our goods abroad. Competition among ourselves in foreign markets is simply playing into the hands of our foreign competitors. It is, therefore, not only desirable, but imperative, that American business men shall be permitted to co-operate and form combinations for the purpose of developing their foreign markets.

It is idle to talk about cutting the profit out of war. There should be no abnormal profits, but the normal profits of business should be maintained, because without such a fair margin of return on capital and labor there will be none of the incentive necessary for increased productive energy.

Selling and Distribution in Steel

BY H. P. BOPE

TO OBTAIN a clear understanding of general conditions in regard to selling what is called "steel construction", two or three fundamental principles must first be taken into consideration. The average individual seems to think that steel manufacture is a very simple operation; that the necessary materials are put in a great pot, for example, called a blast furnace, into which air is blown, melted down and the contents are then ready to serve. This idea does not take into account the ramifications in the products of manufacture, the diversity in the quality of the steels made, and the many special uses to which steel is now applied, nor does it give consideration to the recent development and the varied uses of what we call alloy and electric steels.

Activities of the Manufacturer

Secondly, that the steel manufacturer produces all kinds of steel ready for use by the ultimate consumer, and in the line of elimination of the middleman, the ultimate consumer can buy it if he desires, direct from the maker. This opinion does not take account of the processes of distribution, and the necessity in many cases for further manufacture before the product becomes available to the ultimate user.

In the year 1916 the steel mills of the United States produced a little over 43,000,000 tons of steel ingots. This would represent about 39,000,000 tons of finished product. Out of these grades a total of perhaps 2,000,000 tons went into steel bridges and buildings and another 400,000 tons were used for bars in concrete reinforcement. Under normal conditions about 2,000,000 tons of steel per year are used in the construction of cars, and in the last year, and likely to be for the next two or three years an equal or larger quantity will go into ships.

In the matter of selling practically none of the steel utilized in the items, which we may call constructional work, is marketed by the maker direct to the ultimate consumer. The problem of distribution, therefore, by the manufacturer is not the problem of direct sale to the ultimate user.

One of the great problems in the sale and distribution of steel products is to hold the balance level between customers in similar lines and also not to interfere with the business of such customers by directly participating in those same lines of manufacture. The steelmaker avoids, if practicable, competition with his customers.

One of the important functions of competent salesmanship is to render assistance in the development of new lines of manufacture. Our salesmen, by reason of the education given them from time to time in our mills, are not only well posted concerning our lines of manufacture, but have been instructed to study carefully the development of their customers, and to aid them in every way possible to extend their own lines; and if such extensions require new lines of manufacture such as we are able to supply we generally agree to assist to the extent of the manufacture of such new products. Every year, for example, brings an increasing number of special sections for use in the construction of automobiles, both for pleasure and business, farm tractors and similar lines.

Naturally with the growth of the steel business particularly along the lines of construction, great intelligence is required as to the actual needs of trade and the most stable materials for use in any particular field because the requirements are not always the same. To aid the salesman in this respect, mill testing laboratories and research bureaus have been co-operating with the view of providing each consumer exactly the kind and quality of product best adapted for his individual requirements.

As has already been intimated, the growth of the steel industry has compelled not only a far outlook as to the future in uses which may be called standard, but to obtain new uses which will take up the increasing production. This has been the subject of very careful study and is a part of the instruction to the salesman to so thoroughly familiarize himself with the needs of his trade that he learns instantly of any new designs requiring new sections or calling for increased tonnage of steel, nor have the manufacturers neglected standard lines.

Ships Satisfy Lloyd's Inspection

Up to 1915, for example, the special sections of bulb angles used in shipbuilding abroad, and known as the Lloyd sections, were not manufactured in this country. The increasing demand for ships, however, compelled a consideration of these standard sections, and our own company and some others have prepared rolls to make these bulbs, and as a consequence the American shipbuilding industry has been placed in position to secure its own materials at home and construct ships in every way satisfactory to Lloyd's inspection.

Steel is the one great non-human element in the progress of the human race. Its uses are varied and countless, and in consequence of this the best steel salesman is required to have a knowledge and a comprehensive view of not only present needs, but possible future demands of which his forbears were in total ignorance, and the end is not yet.

Steel Prices Widen Split Over Ships

Chairman Denman Opposes Provisional Basis of 4.25c on Plates, 4c on Shapes and 3.75c on Shapes Arranged by General Goethals—President May Clean Decks of Obstructionists—5,000,000 Tonnage to be Acquired

WASHINGTON, June 19.—Prices to be paid for the 1,000,000 to 1,500,000 tons of steel for the big government ship program promise to be the rock upon which the opposition to the building of steel vessels, personified by Chairman Denman of the shipping board, will split itself. General Goethals, general manager of the emergency fleet corporation provisionally has fixed upon 4.25c, Pittsburgh, for plates, 4c, Pittsburgh, for shapes and 3.75c, Pittsburgh, for bars for the steel for the several hundred merchant ships. This has aroused strong objections by Chairman Denman who consistently has been supporting the building of wooden ships. The shipping board chairman contends that the limit of the prices should be that granted by the steelmakers to the navy and war departments for their 1917 requirements or 2.90c, Pittsburgh, for plates and 2.50c for shapes and bars. It is reported that he may even attempt to force a lower figure. This is based upon his contention that the steel can be manufactured for approximately 2c, Pittsburgh. The present outlook is that Chairman Denman will not be allowed to interfere with the steel ship construction and that if he maintains his attitude, President Wilson may take a hand and force his resignation.

Price is Fixed Tentatively

General Goethals explains that the prices of 4.25c, Pittsburgh, for plates, 4c for shapes and 3.75c for bars are fixed tentatively with the understanding that the committee on raw materials of the advisory commission of the council of national defense later will investigate the costs of manufacture and will determine what should represent an equitable return to the steel producer under present conditions. These prices were agreed upon for the eight steel ships recently awarded to the Los Angeles Dry Dock & Shipbuilding Co. In instructions issued to the shipbuilders at their meeting here last week, General Goethals asked the yards in bidding for the ships to base their figures on the steel prices designated. This is governed by the understanding that if the steel actually is bought at higher levels, the shipbuilders will receive proper compensation. If it is purchased at a lower price, the government is to receive the benefit of the difference.

Within the next few days, President Wilson will officially designate the person or agency for the exercise of the powers conferred by the urgent efficiency bill. These include the right to commandeer ships, ship yards and steel plants and the cancellation of private contracts. Some talk that has arisen intimating that steel plants might be commandeered as a result of the differences between General Goethals and Chairman Denman as to prices are not being taken seriously.

Will Acquire 5,000,000 Tons

Execution of the sweeping powers granted the fleet corporation by the urgent deficiency bill signed by President Wilson last week were outlined at a conference held Friday between the shipbuilders, General Goethals and Chairman Denman. This will mean that within 18 months 5,000,000 tons or more of steel merchant ships will be acquired by the government. Of this total 2,000,000 is represented in vessels now under construction. The remaining 3,000,000 tons will be built during the period named, beginning July 1, according to expectations of General Goethals. The full capacity of every yard will be used for the government. Steel mills will be called upon immediately to supply structural material for the vessels, involving, it is said, at least 1,500,000 tons, of which about 900,000 tons will be plates. This is a greater tonnage of steel ships than it originally was thought could be built.

General Goethals will take over all ships of a cargo-carrying type now under construction, so that shipbuilding can proceed and be handled most efficiently, he said. According to figures of Secretary of Commerce William C. Redfield, there were, on May 1 approximately 2,000,000 tons of steel shipping and 225,000 tons of wooden merchant ships under construction and contract in the country. About 1,000,000 tons of steel shipping in American yards is for British account.

Will Charter Ships to Private Operators

The British government will turn this over to the United States voluntarily. The vessels as fast as built—and they will be expedited under a three-shift working basis—will be chartered by the shipping board to private operators and perhaps in some instances to the allied governments.

Shipbuilders were told the government at this time has no intention of taking over their yards if they exert their utmost efforts to speed construction. They were advised to immediately clear their ways by expediting work on ships now building, and where they are not doing so to devote their energies to the production of cargo-carrying ships. The shipbuilders are to make a careful survey of what they can do in the way of rushing existing contracts, and of their ability to take on other work, and report at an early date. Request is also made for figures on costs of labor and material. These and other important data will be given to the builders by General Goethals in an inventory sheet. This information also is to be used in connection with the awarding of contracts. Yards will be asked to build ships of the types for which they are best adapted, although a general system of standardization is to be followed at new yards to be built and at some of the establishments now existing. General Goethals was asked about the report that shipbuilders from Puget Sound were not able to get sufficient plates for construction purposes. He stated that there was some complaint, but he expressed confidence that the difficulty soon would disappear.

Want Federal Labor Control

Pacific coast builders joined in the recommendation of the eastern builders for some kind of government labor control. To an intimation that they would like to have the government handle the labor unions, Chairman Denman replied emphatically: "I think it would be asinine for us to start a labor controversy in congress at this time." Ship workers in the east have declined to work under an open shop arrangement and the labor problem is causing more or less apprehension on the part of government authorities. It probably will be necessary soon to employ open shop methods to increase the output of plants. Moreover, it is stated that in some of the plants many employes are indifferent as to whether they work or not. There are yards, it is claimed, whose regular working force is not much more than two-thirds of the entire number on the payrolls.

The urgent deficiency bill appro-

priates $750,000,000 for the construction and purchase of ships.

Urges Standardization of All Munitions

Washington, June 19.—Calling for information from the secretary of war with regard to the manufacture of machine guns, field artillery and Enfield rifles for the American army and the standardization of munitions, the senate has adopted a resolution offered by Senator Smoot, of Utah. The information is to be given provided it is not "incompatible with the public interest".

The resolution reads as follows:

Has the British Enfield rifle been adopted for the American army, and if so, are such rifles being chambered so as to fit the American type of rifle cartridges?

Are machine guns for the use of the American army using the same type of rifle cartridge as the army rifle to be used by the American army?

Do the American cartridges for use in rifles and machine guns differ in size or otherwise so as to prevent their being used in the rifles and machine guns of the English or French? If so, what is the character of the difference, and what advantage is gained thereby?

To what extent does the field artillery of the American army differ in caliber and character of ammunition used from that of the English and French armies?

Can the ammunition of the English or French armies be used in the field artillery of the American army?

If the American ammunition for rifles, machine guns and field artillery is not interchangeable for like British or French guns, what advantage is gained by having it differ from that of the English army or the French army?

Senator Smoot explained that it has been repeatedly stated that an 8-inch shell used by the army could not be used in an 8-inch gun in the navy. It has also been stated, the senator said, that plants in this country that are manufacturing the Enfield rifle for the English and French governments are producing the same rifle for the American government, but chambering it to take American ammunition. Senator Smoot urged the necessity of having munitions so standardized that they can be used interchangeably by the American, French and British troops.

Plan to Build Airplanes on Great Scale

Washington, June 19.—Immediate appropriation of $600,000,000 by congress for airplanes with total authorizations aggregating $1,000,000,000 is the progrram of the council of national defense, and it is supported by General George Owen Squier, of the war department. The present appropriation for airplanes is only $64,000,000, but it is believed that congress is convinced of the providing for the execution of the program of the council, enunciated through Howard E. Coffin, chairman of the aircraft production board. The aircraft production board has proposed the building of 3500 airplanes and training of 5000 aviators this year, but is considered that the government will need at least 20,000 or 30,000 of these machines for training purposes. It is believed manufacturers can produce 2500 airplanes monthly.

Cantonments to Require Big Steel Tonnage

Washington, June 19.—Steel requirements for the 16 cantonments for the new American army will be awarded direct by the contractors. Large tonnages will be required since each cantonment is to house 40,000 men. All the camps are to be completed by September. General contracts have been placed in a number of instances. In a typical cantonment, lumber is the big item, some 26,000,000 feet, or 1325 carloads being required. Roofing nails alone will fill one modern freight car. Other items are 28,000 squares of roofing, 60 cars; 20 carloads of nails and hardware; 20 carloads of plumbing; 192 carloads of tanks, heaters, stoves, ranges, piping and electrical material; railroad materials for five miles of track, divided into 30 carloads of ties and other timber; 20 carloads of spikes, rails, fish plates, etc., and 20 carloads of construction tools. Awards have been made for 325,000 steel cots at $3.10 each to the Simmons Co., Kenosha, Wis., and more contracts for cots are pending at the present time.

Each cantonment will contain close to 1000 buildings. The typical company barracks will be a two-story structure built of wooden frame covered with matched board. The roofs will be covered with prepared roofing. They will be well ventilated with flues, lighted by electricity, heated in the north by steam and in the south by stoves. No price has been fixed, it is stated, for pig iron entering into the manufacture of radiation for the camps.

The emergency construction committee of the general munitions board of the council of national defense has determined upon a fee system to be applicable to the building contracts. The fees vary from 10 per cent on small contracts of $100,000 or less to 6 per cent on contracts of more than $3,500,000 with an upset limit of $250,000. The fees in all cases cover both profit and overhead expenses. Contracts so far let include: Ayer, Mass., to F. J. Ley & Co.; Wrightstown, N. J., to Irwin & Leighton; Columbia, S. C., to Hardaway Construction Co., and Atlanta, Ga., to Arthur Tufts Co.

Way is Paved For Billion Ton Coal Production

Washington, June 19.—Far-reaching results are expected from a meeting June 16 in the office of Secretary of Labor Wilson with representatives of the United Mine Workers of America, the American Federation of Labor and the committee on coal production of the council of national defense, said W. S. Gifford, director of the council. As a result of complaints by the United Mine Workers that organized labor was not represented on the committee of coal production, the names of members of that organization have been added. A price of $2.33½ a ton has been decided upon tentatively for bituminous coal for the navy pending a final finding by the federal trade commission, which will make an investigation as to the cost of production.. The promised production of coal next year is 1,000,000,000 tons under an agreement of the United Mine Workers and the council of national defense.

Railroads Cannot Place Normal Car Orders

Washington, June 19.—Under existing high prices, and with the liability of car builders to get material, it is unlikely that American railroads will be able to order and secure as many as 150,000 cars, the average annual addition of freight equipment, during the next year, although they have about 100,000 cars still undelivered on back orders. This condition was set forth in a statement issued by President Fairfax Harrison, of the Southern railroad, as chairman of the executive committee of a special committee on national defense. It was prompted by reason of the consideration being given by the car supply committee of the council to a plan to have the government purchase freight cars. Mr. Harrison said that if the government should acquire 50,000 to 75,000 cars, the railroads will be glad to make use of them on substantially the same basis as other privately owned cars are used.

Ore and Coke Rates Up: Costs Rise

Horizontal Advances of 15 Cents a Ton on Iron Ore and Coke Boosts Pig Iron Producing Costs—Ore Rates Higher Due to Readjustments

NEW RATES on iron ore handled through Lake Erie docks, and on coke, are now being charged by the railroads. An increase, to go into effect July 1, in the rates for carrying coal also has been filed. The net result of these advances is, of course, an increase in the cost of producing pig iron.

The coke rate increase is a horizontal one of 15 cents a ton. The advance in iron ore rates also is 15 cents a ton, but this is complicated by the readjustments made in the entire ore rate fabric of that portion of Pennsylvania west of and including Johnstown, and of Ohio, West Virginia and Kentucky. The readjustments cause an irregular increase in the rates to different points in the districts outlined which is over and above the straight 15-cent advance. In the case of ore going to points outside of these districts, the new rates represent simply the horizontal increase of 15 cents per ton recently approved by the interstate commerce commission.

A comparison of the old and new rates on iron ore to the principal consuming points is shown in Table I.

New and Old Rates Compared

The old tariffs, as indicated, showed only a difference of 8 to 10 cents a ton between ore handled direct and ore handled from dock. Eastern points, as well as Pittsburgh, the valleys, Wheeling and Johnstown, Pa., had a dock rate which was 8 cents higher than the direct rate. Ashland, Ky., Columbus, Ironton and Jackson, O., had a rate which was 10 cents higher on dock ore. The new tariffs, however, to points in Ohio, West Virginia, Kentucky and that part of western Pennsylvania outlined, provide for a 6-cent handling charge from the rail of the vessel to the car, on direct ore. On dock ore, the new tariffs include a handling charge from the rail of the vessel to the dock of 16 cents and from dock to car of 10 cents.

The charges which the railroads are required by the commission to apply when transporting iron ore are:

1. Handling the ore from the rail of vessel to the car when for immediate shipment to interior destinations;
2. Handling the ore from the rail of the vessel to the storage yard;
3. Storage of the ore while held in the storage yard;
4. Handling the ore from the storage yard to the car for shipment to interior destinations;
5. Road haul from the ore docks to the point of interchange with the private industry track at the final destination;
6. Switching the ore over private industry tracks and placing it at the point or points of unloading within the inclosure of the industrial plant;
7. For the detention of shipments enroute from the ore docks to the point of interchange with the private industry track at final destination, when such detention is made at the request or direction of the consignee.

The commission further specifies and the railroads have put into effect the following charges in conformity with the above:

For handling the ore from the rail of the vessel, or point where it is received by carriers for transportation by rail, into the cars when for immediate shipment to interior destinations—6 cents;

For handling the ore from the rail of the vessel, or point where it is received by carriers for transportation by rail, to the storage yard—16 cents;

For handling storage ore from the storage piles into the cars for shipment to interior destinations—10 cents;

For storing ore on the docks, per month, from date of unloading from vessel—1 cent.

Expressed simply, this means: The old Pittsburgh rate on direct ore, as an illustration, was 88 cents. This included all charge from the rail of the vessel to the storage pile in the furnace yard. In the general readjustments, the Pittsburgh rate was cut down to 76 cents. The 15-cent increase granted the railroads brought this back to 91 cents. This rate, however, applies only on the line haul. To it must be added 6 cents for the new handling charge from vessel to car, as well as a switching charge for spotting the car in the furnace yard, provided the furnace plant has no switching facilities of its own. These switching charges by direct order of the commission, must vary to conform with the peculiar conditions of each yard. The switching charges generally are from 2 to 4 cents a ton.

To use the same illustration: The Pittsburgh rate on dock ore was 96 cents a ton. The old charge of 8 cents is wiped out and the new dock ore rate is built up as follows: Line haul, 91 cents; handling charge vessel to dock, 16 cents; handling charge dock to car, 10 cents; total rate from vessel to furnace switch, $1.17.

The other charge required, that is, the storage charge of 1 cent a ton a month, is computed upon the weighted daily average tons of ore in storage.

The commission also ordered the railroads to establish rates on iron ore, when shipped from private docks served by short-line railroads that are entitled to receive allowances, that shall not exceed by 4 cents per ton the rates established by the line-haul carriers from the docks located on their own rails. By "private docks" the commission referred to nonrailroad docks which are adjuncts to or integral parts of furnace plants immediately adjoining on the lake front. These docks, while primarily serving the plants of which they are a part, also forward ore to interior furnaces, either to those owned by the same company which operates the docks, or to outside companies.

This ore rate readjustment, exclusive of the recent 15-cent increase, arose several years ago when the commission instituted an inquiry into the entire ore rate fabric. On July 10, 1916, a tentative order was issued with a view of securing further suggestions before a final order was issued. The final order was issued April 25. The most important change from the tentative order was the reincorporation of Donora and Monessen, Pa., in the Pittsburgh-Wheeling district. These points had been put in the Johnstown district. The new Leetonia district was maintained.

New Charges on Dock Ore

The new rates impose a greatly increased charge against dock ore. In place of the former charge of 8 to 10 cents a ton—which charge was the difference in rates between direct and dock ore—there is a levy of 16 cents for handling ore from vessel to dock and of 10 cents from dock to car.

These charges total 26 cents, an increase of 16 to 18 cents over the old rate of 8 to 10 cents. Direct ore now bears a charge of 6 cents for handling from vessel to car, so that, when compared with direct ore, dock ore now must pay a levy of 20 cents before the ore leaves the dock. This amounts, of course, to an increase of 10 to 12 cents over the former charge of 8 to 10 cents against dock ore.

The charge on ore stored in the dock yard, according to the commission, was not to be more than 1 cent a ton a month. Table II shows an example of how the railroads are levying this charge.

The interstate commerce commission in its final order frankly admitted its inability to determine the actual effect of these new charges against dock ore. The order stated that "both the furnace operators and the carriers seem to

Concise Examples of How Ore Rate Increases Work Out

Table I

New Iron Ore Rates

From lower lake ports to:	*Direct	*From dock
Ashland, Ky.	$1.05	$1.25
Baltimore	1.65	1.73
Columbus, O.	.65	.85
Ironton, O.	1.05	1.25
Jackson, O.	.775	.975
Johnstown, Pa.	1.09	1.29
Leetonia, O.	.76	.96
Lehigh valley	1.60	1.68
Midland, Pa.	.85	1.05
Pittsburgh	.97	1.17
Sparrows Point	1.65	1.73
Valleys	.71	.91
Wheeling	.97	1.17

*Includes dock charge (6 cents on direct and 26 cents on dock ore to points in Ohio, Kentucky, West Virginia and western Pennsylvania), but does not include storage or destination "spotting" charge.

Old Iron Ore Rates

From lower lake ports to:	Direct	From dock
Ashland, Ky.	$0.90	$1.00
Baltimore	1.50	1.58
Columbus, O.	.50	.60
Ironton, O.	.90	1.00
Jackson, O.	.625	.725
Johnstown, Pa.	1.02	1.10
Leetonia, O.	.56	.64
Lehigh Valley	1.45	1.53
Midland, Pa.	.70	.78
Pittsburgh	.88	.96
Sparrows Point	1.50	1.58
Valleys	.56	.64
Wheeling	.88	.96

Table II

How Storage Charges Are Computed

INTO STORAGE

	Tons.
Ore on dock July 1	300,000
Placed on dock July 2	5,000
Placed on dock July 5	5,000
Placed on dock July 8	5,000
Placed on dock July 15	5,000
Placed on dock July 22	5,000
Placed on dock July 27	5,000
Placed on dock July 30	5,000

Debit:

300,000 tons @ 31 days =	9,300,000 tons	1 day
5,000 tons @ 29 days =	145,000 tons	1 day
5,000 tons @ 26 days =	130,000 tons	1 day
5,000 tons @ 23 days =	115,000 tons	1 day
5,000 tons @ 16 days =	80,000 tons	1 day
5,000 tons @ 9 days =	45,000 tons	1 day
5,000 tons @ 4 days =	20,000 tons	1 day
5,000 tons @ 1 day =	5,000 tons	1 day
Total	9,840,000 tons	1 day

FORWARDED

	Tons.
Forwarded from dock July 3	10,000
Forwarded from dock July 8	10,000
Forwarded from dock July 13	5,000
Forwarded from dock July 20	5,000
Forwarded from dock July 23	5,000
Forwarded from dock July 29	10,000

Credit:

10,000 tons @ 28 days =	280,000 tons	1 day
10,000 tons @ 23 days =	230,000 tons	1 day
5,000 tons @ 18 days =	90,000 tons	1 day
5,000 tons @ 11 days =	55,000 tons	1 day
5,000 tons @ 8 days =	40,000 tons	1 day
10,000 tons @ 2 days =	20,000 tons	1 day
Total	715,000 tons	1 day

Debit ..... 9,840,000 tons
Credit ..... 715,000 tons

9,125,000 tons divided by 31 days = 294,355 tons
1 month @ 1 cent per ton = $2,943.55

concur in thinking that under the schedule there will be a decrease in the relative volume of dock ore, as to which some increase in the charges is granted; but whether the application of the new charges will result, on the whole, in an increase of revenue or whether shippers will make less use of the storage docks and thereby decrease the aggregate of carriers' revenues for dock ore is a question resting in conjecture. In any event, a careful examination of the figures submitted on both sides satisfies us that if the revenues are increased as the result of these rates and charges, it will be to a relatively small extent, and will not impose any substantial, additional burden on the iron ore traffic."

In recent years, Lake Erie docks have rarely held a smaller balance than 5,000,000 tons. The May 1 dock balances, which are naturally the smallest of the year, averaged from 1,725,000 tons to 4,500,000 tons between 1900 and 1907. Since that time, the May 1 balances have ranged between 5,200,000 tons and 6,775,000 tons, except in 1916, when it was 3,343,000 tons and in 1917 when it was 4,772,000 tons. Between May 1 and Dec. 1, the balance shows an upward trend and on an average the balance on Dec. 1 is about 9,000,000 tons. When it is recalled that these balances are to be turned over monthly at a rate of 1 cent a ton, the additional burden imposed against consumers who carry ore on dock, is quickly apparent.

Furnaces, naturally, will be reluctant to hold any larger tonnage of ore than is made necessary by the limitations of their own yards and by the amount the railroads can transport. Dock balances, therefore, can be expected to decrease from now on.

The order in which the interstate commerce commission sets forth its final decision in these famous ore rate cases, also disposes temporarily of the troublesome question of whether Monessen and Donora, Pa., are to be considered as part of the Johnstown or Pittsburgh-Wheeling districts. Both points were originally in the Pittsburgh district. The tentative order issued by the commission on July 10, 1916, placed these two points in the Johnstown district to which the rates are higher. At the same time, furnaces at Leetonia and Dover, O., and New Castle, Pa., were grouped into a new district known as the Leetonia district. These furnaces formerly secured the valley rate.

In the final order, the Leetonia district was maintained, but Monessen and Donora were put back into the Pittsburgh-Wheeling district. The commissioner's order shows that the latter question is not definitely settled, however. The report states "while Donora entered only a somewhat general objection to the proposed change, there was a strenuous protest on the part of Monessen against being placed in a higher rate territory. The question is one of no small importance and we shall therefore not now disturb Donora and Monessen as points in the Pittsburgh district; and while the order herein will not require that course we shall nevertheless expect the carriers to establish for the present to Donora and Monessen the rates prescribed to the Pittsburgh-Wheeling group, pending a further consideration of the matter."

Calls Executive Meeting

W. H. Vandervoort, president of the National Metal Trades Association, has called a meeting of the executive committee at the national office, 1021 Peoples Gas building, Chicago, June 26.

The Wharton Steel Co. has blown in its No. 3 blast furnace at Wharton, N. J. The output will be basic at the rate of approximately 500 tons a day.

Puddled Iron and Coal Vexes British

Men in Trenches Fight Against Return to Forges—Fuel Shortage Still Serious —American Sources of Supply in Steel and Munitions Expected to Relieve Tense Demands on Home Capacity

Bureau of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., May 25.

MUCH comment has been caused by the action of the government in stopping the erection of a large factory at Bristol, intended exclusively for war production. It is a striking evidence of the confidence with which the military authorities regard America as a source of war material. It will also liberate a large quantity of structural steel, and allow a certain amount of labor to be diverted to other channels, where it is very much wanted. It will be a little relief to the iron founders. It cannot be said that in other directions, however, that the government is making much modification of its orders. Occasionally, a big contract is cut down, but this often enough is followed in a day or two by an expansive and urgent instruction, showing that the diminution was entirely a matter of temporary expediency. All the order books are crowded with business, sufficient to see all the works engaged for many months to come.

At present the most pressing problem relates to the supply of puddled iron which is lamentably deficient. Large quantities are called for and could be promptly utilized. The provoking circumstance is that large numbers of puddling furnaces in the black country are idle, and could be started up if the requisite skilled men were available. One of the ironies of this war is that in its early days it carried off a number of skilled workmen whose contribution at the puddling furnace would have far outweighed in importance any service they could render in the field. The authorities have found that the restoration of the men to the furnaces is a much more formidable task than that of getting them into the army. In some cases very capable workmen, from mistaken patriotism or genuine war enthusiasm, have put obstacles in the way of their return to civil life, while, in other cases, men have been brought back whose industrial value has been a doubtful quantity. Weeks of search have sometimes been necessary to find a particular ex-ironworker.

Next to the labor question fuel scarcity is most serious. Some Staffordshire ironworks are still making short time through lack of coal, or the inferior quality of the fuel. This is being slowly remedied. Unfortunately, there is the approaching holiday, which will further cut down supplies, also insufficient canal accommodation, railway congestion, scarcity of carts, carters and the like. An agitation for the enlistment of young miners has been started, and such a development will be strongly resisted by the iron and steel trades.

Business is immensely brisk in the Glasgow district, the mills producing almost wholly for the war. Export business is restricted to limited quantities for the allies. Black sheet makers are busy for the government, especially on heavier gages, and malleable iron is active. The makers of tin plates have full order books for several months. They now are booking very carefully in view of uncertainty over tin bars. American imports appear to be restricted to a few wire rods, selling at about £22 per ton. Government assistance has been appealed for to get this material over and some really substantial help has been received.

The engineers' strike had a direct effect upon the steel output, because certain of the largest firms had to suspend operations. In several instances rolling plants had to be stopped. Fortunately, the strike is now at an end, and mills have mostly resumed.

An advance of £5 per ton has been announced in finished steel wire, following one of £3 in January last. The whole question of semisteel becomes increasingly difficult. The best solution of the problem would, undoubtedly, be large and facilitated imports from America.

The government has, apparently, allowed iron and steel manufacturers to make their own Whitsunday holiday arrangements next week which may be taken to mean that demands for war purposes are not exactly urgent. Most of the iron works will take a two days holiday. This, of course, will not apply to the blast furnaces, so that stocks of pig iron should be increased. On the whole, the make of pig iron tends to increase, although the practical absence of Cleveland stocks shows that all the tonnage is going into consumption. Now that the government has become interested in the manufacture of basic iron, the market has considerably hardened for other descriptions. This has been a decided benefit to Northampton, which occasionally showed weakness. Smelters are agreed on the policy of accepting as little tonnage as possible. Contrary to general expectation, the ministry of munitions is still withholding its decision as to prices. The makers of common Staffordshire iron express themselves very much concerned over the delay, as they declare they are at present making iron at a loss. The application does not include best brands, the makers of which admit that they are in a very good position. It is possible that the ministry of munitions is awaiting the issue of the usual wages board return, which not unlikely is to declare another advance. Strong representations have been made to the authorities that the increased production of basic pig iron will necessitate withdrawals of ironworkers from the army. In the Cleveland district, present sales are chiefly for delivery to the end of October, and in all cases the maximum rates are being readily paid. The improvement in the make of iron enables larger supplies to be sent to Scotland and to the Midlands. While there are no Cleveland stocks, current requirements are being very fairly met, and it is thought possible that improved shipments to neutral countries and especially to the allies may be authorized. Hematite is in very strong demand, and the requirements are still in excess of supply. On the east coast, makers are unable to deal with all the business on offer. Prices in that district are unchanged.

American Ship Program Thrills England

EVERY mail brings news of war activities in America, every one of which must hasten the day of decision. One of the most impressive is the indication received today of the gigantic enterprise of the United States Steel Corporation in connection with its new shipyard at Newark, the result of which is to mean a daily launch of a 5000-ton steel freight vessel. By this time, doubtless, Germany is sensible enough to regret the forcing into the war arena of a nation with such tremendous resources in war material.

Ferro Increases

April Imports Exceed March by 1500 Tons—Manganese Ore Declines

Efforts to increase the shipments of ferromanganese from this country to England are bearing some fruit, as is shown by the April imports of this metal, which were approximately 1500 tons greater than in March. The April figures were 6846 gross tons compared with 5324 gross tons in March. The April figures were close to the monthly average for the 10 months of the fiscal year, the total for which was 67,905 gross tons.

Manganese ore shipments fell off sharply during April and were only 27,023 tons, compared with 56,394 tons in March, 1917, and 52,510 tons in April, 1916. The reason for this marked reduction is not apparent.

Imports of ferromanganese, ferrosilicon, manganese ore and various steel-making ores, in gross tons, are as follows:

	April, 1917	April, 1916	Ten m'ths end'g April, 1917	April, 1916
Ferromanganese.	6,846	.....	67,905	.....
Ferrosilicon ...	1,108	754	6,732	4,516
Manganese ore.	27,023	52,510	512,041	359,892
Tungsten bearing ore	124	.....	3,076	.....
Nickel, nickel oxide & matte	2,110	2,324	27,100	25,321

Exports of ferroalloys are as follows:

	April, 1917	April, 1916	Ten m'ths end'g April, 1917	April, 1916
Ferrotungsten and tungsten metal..	75	.....	512	.....
Ferrovanadium	26	24	938	347
Nickel, nickel oxide and matte	1,025	1,402	12,403	8,794

Leases Burden Stack

The blast furnace of the Burden Iron Co., at Troy, N. Y., has been leased by Frank B. Baird, president of the Buffalo Union Furnace Co., Buffalo. The stack will be repaired at once and probably will be put in blast within 60 days on foundry iron. This furnace was built in 1905-6 and has an annual capacity of about 90,000 tons. It has not been operated since 1907.

Issues Stock List

The practice of issuing monthly stock lists has been inaugurated by the Buffalo Wire Works Co., Buffalo. The first list, dated June, 1917, appears in a 40-page booklet, and contains brief specifications of steel, galvanized, tinned, brass and copper wire cloth available for prompt shipment.

Will Develop Graphite

The Joseph Dixon Crucible Co. of New Jersey has obtained permission to do business in Alabama. Valuable flake graphite properties in Clay and Coosa counties were acquired by the company some time ago and plans are being made for their development. According to the statement filed with the secretary of state, $200,000 is to be utilized by the company in its Alabama operations.

Pacific Stack

Will Resume Operations on Chinese Ore—Building Shape Mill

San Francisco, June 19 (Staff Correspondence.)—The Pacific Coast Steel Co. expects to blow in the blast furnace at Irondale, Wash., soon to smelt up about 20,000 tons of Chinese ore imported some time ago. Furnace may continue in blast on local ores for a time. The company also is building a mill to roll small shapes. The Pacific Coast Steel Co. is not interested in the new project for a blast furnace on Puget sound to utilize Haines Alaska ores. This project is being separately promoted by Salt Lake and San Francisco capital. It is not yet certain whether ores are satisfactory.

Sheet Metal Men Hold Annual Convention

The National Association of Sheet Metal Contractors on June 15 closed its 4-day convention at the Hollenden hotel, Cleveland, at which over 500 members were present. Milwaukee was decided upon for 1918. George Harms, president, in his annual address, emphasized the need of giving young men a proper vocational training in order to teach them the intracacies of sheet metal work. Vocational training was also described in a speech by Professor Frank Glynn, Wisconsin State university.

Thursday was devoted to a meeting of the Ohio state association, President Frank J. Hoersting presiding. Addresses were given by D. K. Swartwout, Ohio Blower Co., Cleveland, on "Selling Contracts", and by E. A. Scott, editor, *Sheet Metal*, on "The Business Side of Industrial Education". The manufacture of sheets and tin plates was shown in moving pictures and described by D. M. Buck, metallurgical engineer, the American Sheet & Tin Plate Co.

To Build Locomotives

The Glover Machine Works, Marietta, Ga., will install an electric furnace for the manufacture of steel castings as well as a forge shop and such equipment as steam hammers, sand-blast machinery, grinders, sand mixing machinery, etc., now is being purchased. A specialty will be made of the manufacture of industrial locomotives.

Alloy Elements

In Steels to be Discussed by Testing Materials Society

Sixty-four papers and committee reports are scheduled for presentation and discussion at the annual meeting of the American Society for Testing Materials, to be held at the Hotel Traymore, Atlantic City, June 26 to 29.

The Saturday sessions have been eliminated this year and the meeting will close Friday evening. On Tuesday morning the report of the committee on wrought iron will be presented and officers for the ensuing year will be elected. Cast iron, corrosion and testing constitute the topics that will be considered Tuesday afternoon and on Tuesday evening A. A. Stevenson, president of the society, will deliver his annual address. Wednesday morning will be devoted to the presentation of committee reports and papers on steel and iron. This will include committee reports on steel, by C. D. Young, chairman and on the heat treatment of iron and steel, by Albert Sauveur, chairman.

Unusual interest already is manifested in the topical discussion on the role of the several alloying elements in the alloy steels, in which the following will participate: Manganese, Henry M. Howe; nickel, R. R. Abbott; silicon, W. E. Ruder; vanadium, G. L. Norris, and chrome vanadium, F. J. Griffiths. One session will be devoted to the consideration of nonferrous metals on Wednesday evening when the report of the committee on nonferrous alloys will be presented by Wm. Campbell, chairman. Preservative coatings and miscellaneous materials will be considered Thursday morning and on Thursday evening, papers and committee reports on cement and concrete will be presented. Three sessions will be held on Friday as follows: Concrete and lime, 10 a. m.; ceramics, 3 p. m. and miscellaneous materials, 8 p. m.

Extends Aircraft Plant

The Curtiss Aeroplane Co., Buffalo, now is using a large part of the plant of the McKinnon Dash Co. and a part of the plant of the Buffalo Smelting Co. as Buffalo. In addition, the plant of the Buffalo Incubator Co. has been leased and it is said that negotiations are under way for the leasing of the plant of the Buffalo Copper & Brass Rolling Mill. With the plant additions acquired and those now under negotiation, the Curtiss plant will be the largest in the world, it is stated.

The Industrial Foundry & Machine Co., Pottstown, Pa., just has taken possession of its new 50 x 135-foot plant in that city.

Men of the Iron Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

HENRY M. LELAND, general manager of the Cadillac Motor Car Co., Detroit, and his son Wilfred C. Leland, whose names have been connected so prominently with the perfection of gasoline engines have announced their retirement from the automobile industry to devote their time and interests to the call of the nation. They are dedicating their services to the task of building up a powerful aeroplane fleet that will give the United States mastery of the air in the present war. On leaving the automobile field, Henry M. Leland in a characteristic statement said: "The Cadillac company has been dearer to me than any one other thing in the world excepting my home, but there has arisen now a claim on my loyalty that is nearer and dearer still. The world's greatest need at this moment is America, the America's paramount need now is mastery of the air.

"For months I have been chafing against conditions which made it impossible for myself and my son to engage such abilities as we may possess in the service of the government. Now we shall be masters of our own business, and ready to dedicate ourselves heart and soul to the gravest crisis that has confronted the world since the beginning of time."

Early in the war Henry M. Leland visited England to study the requirements of the aviation division. He has been repeatedly called to Washington to confer with the National defense council and his judgment has been sought in the development of plans for air defense and offense which now are crystallizing. R. H. Collins of Detroit, will be the new general manager of the Cadillac company. Mr. Collins formerly was with the Buick Motor Co., Flint, Mich., and has, for the last two years, been assistant to President W. C. Durant.

F. William Richards, New York, has assumed the general management of the Columbia Malleable Castings Co., Columbia, Pa.

William Hamlin Childs, president of the Barrett Co., 17 Battery place, New York, has been elected trustee of Syracuse university.

James Farrington, superintendent, electrical department, La Belle Iron Works, Steubenville, O., talked about "By-product Coke Ovens in the Steel Industry," June 16, before the Association of Iron and Steel Electrical Engineers, following the monthly dinner, at the Monongahela House, Pittsburgh.

Veryl Preston, president of the Eastern Steel Co., Pottsville, Pa., has been

HENRY M. LELAND

elected director of the Hedley Gold Mining Co.

Alfred O. Buckingham, Columbian Hardware Co., Cleveland, O., is a member of the Lakeside hospital unit now in France.

J. H. Steedman, vice president and general manager, Curtis Pneumatic Machinery Co., St. Louis, is a lieutenant in the United States navy.

James H. Slawson, for some time past Chicago sales agent of the National Malleable Castings Co., Sharon, Pa., has been chosen vice president of the Joliet Railway Supply Co., Joliet, Ill., a subsidiary of the Northwestern Malleable Iron Co. of Milwaukee, Wis.

Charles Oliver, in charge of sales, the Oliver Iron & Steel Co., Pittsburgh, has enrolled with the officers' reserve corps, stationed at Fort Niagara, N. Y.

T. A. Ireland, connected with the sales department of the Butts & Ordway Co., Boston, is captain of Company H, sixth regiment, Massachusetts national guard.

Samuel Mather of Pickands, Mather & Co., Cleveland, gave $100,000 in railroad securities to Kenyon college on the occasion of its eighty-ninth commencement.

Robert Parks, formerly general manager of the Bettendorf Co., Bettendorf, Iowa, has left that company to become associated with the Canadian Car & Foundry Co., Montreal, Que.

B. F. Affleck, of Chicago, was re-elected president and T. J. Hyman, of Chicago, secretary and treasurer of the Universal Portland Cement Co., at the annual meeting held at Gary, Ind.

Isaac G. Haas, president of the Empire Plow Co., Cleveland, is seriously ill. He was rushed home recently from Pasadena, Cal., where he had hoped to regain his failing health.

Victor E. Page, for six years experimental engineer at the New Departure Mfg. Co., Bristol, Conn., who is a first lieutenant in the United States Aviation Corps, is acting as an instructor at the aviation station at Mineola, L. I.

C. A. Newman, formerly manager of sales for Henion & Hubbell, Chicago, whosalers in mining and mill supplies, has been made sales managerger of the Boiler Kote Co., with general sales offices in the Fisher building, Chicago.

Charles Hagie has been re-elected president of the Scully Steel & Iron Co., Chicago, George Gleason, Jr., vice president in charge of sales, G. H. Avery, vice president in charge of credits, and T. J. Hyman, secretary-treasurer.

Louis O. Trubshaw, superintendent of erecting engineers for the Vilter Mfg.

Co., Milwaukee, has been called into the federal service at Fort Sam Houston, Tex. Mr. Trubshaw entered the quartermaster officers' reserve corps with the rank of captain six months ago.

Arthur M. Torrey, formerly with W. S. Barstow & Co., Inc., has left that organization to re-enter the employ of Hildreth & Co., 15 Broad street, New York, inspection engineers, with which he was formerly connected.

W. E. Mansfield, for the past five years chief chemist with the Page-Storm Drop Forge Co., Chicopee, Mass., has resigned to become chief chemist and metallurgist with the Cayuga Tool Steel Co., Ltd., Auburn, N Y.

G. J. McFadden, formerly connected with the Chicago Pneumatic Tool Co., Chicago, now is general manager of the Nagle-Corliss Engine Works, Erie Pa., manufacturer of gas and steam engines, air compressors and vacuum pumps.

L. M. Johnston, general manager, A. M. Byers Co., Pittsburgh, was the principal speaker at the final meeting of the season of the Pittsburgh section, American Institute of Electrical Engineers, June 12. The subject of his address was "Selective Conscription and What it Means".

J. G. Butler Jr. has begun the construction on a prominent site in Youngstown of an extensive art gallery to accommodate his private collection of paintings and other art subjects. The building will be of marble and when complete will represent an expenditure of a quarter of a million dollars.

Arthur F. Braid has assumed the duties of metallurgical engineer in charge of metal sales for the Goldschmidt Thermit Co. of Jersey City, N. J. He succeeds DeC. Brown, who has joined the officers' reserve corps at Plattsburg and probably will continue with the army.

H. M. Roche, formerly in charge of the Mt. Hope, N. J., mines of the Empire Steel & Iron Co., has been appointed superintendent of mines for the Wharton Steel Co. at Hibernia, N. J., effective July 1. Preparations now are being made to pump out the Hibernia mine and again put it in operation.

F. M. Wicks, Milwaukee, manager of the Milwaukee works of the Westinghouse Lamp Co., has been selected by the industrial commission of Wisconsin as chairman of a special committee to assist it in revising its order relating to shop lighting. The committee will draft minimum standards for both natural and artificial lighting in industrial plants in Wisconsin. Richard Finn, Cutler-Hammer Mfg. Co., also is a member of the comn ittee.

Marshall Williams, in charge of the plants of the American Bridge Co. in the Pittsburgh district, has been appointed assistant to August Ziesing, president, with headquarters at Pittsburgh. George M. Hunter, successor to Mr. Williams, has been succeeded by P. W. Seil as manager of the Gary plant of the American company.

E. J. Buffington was re-elected president of the Illinois Steel Co. at the annual meeting recently. D. W. Robinson was renamed as first vice president, G. H. Thorpe, second vice president and T. H. Hyman as secretary and treasurer. Messrs. Buffington, Thorpe and Hyman also have been re-elected as president, vice president and secretary-treasurer of the Indiana Steel Co.

Less Pig Iron

But More Steel Made in Canada First Quarter of 1917

Toronto, June 16.—The mines branch of the Canadian Department of Mines has received complete returns of the production of pig iron in Canada, and with the exception of three small plants returns of the production of steel ingots and castings during the first three months of 1917. Pig iron was produced to the amount of 276,777 tons, being an average monthly production of 92,259 tons as against an average monthly production throughout 1916 of 97,438 tons. The total production of steel ingots and castings for the three months was 403,880 tons, an average monthly production of 134,627 tons, as against an average monthly production of 106,268 tons during 1916.

Development of the iron ore deposits of Iron Mountain, in the Sudbury district, is well under way, with a force of 150 men at work and a milling unit of 300 tons daily capacity in operation. A spur line 4 miles in length is being built to connect the property with the Canadian Northern Railway. The concentrates from the mill will be briquetted and shipped out to be smelted. From exploration work it is estimated that about 7,000,000 tons of merchantable iron ore are available. Should the work now in progress prove the proposition to be commercially workable operations will be greatly increased.

The Canadian government is adding considerably to the equipment of the government railroads, and may lease rolling stock to other lines unable to make necessary additions. Contracts for 5000 cars have in all been let. Some weeks since the Eastern Car Co. of New Glasgow, N. S., and the Canadian Car & Foundry received orders for 1000 cars each, and this week the Car & Foundry Co. obtained an additional contract for 3000 cars. Further contracts for the building of 5000 cars are still under consideration. There are now 100 locomotives under contract for the government.

Mills For France

Now Wanted From American Builders—Three Plate Stands Asked

That the iron industry of France, now devoting its capacity to the manufacture of munitions is completing plans for greater commercial activity after the war ceases, is indicated by the appearance at Pittsburgh of definite inquiries for three large plate mills, contracts for which likely will be awarded before the end of the year. George M. Demorest, engineer, Dollar Savings & Trust building, Pittsburgh, is acting as American engineer in charge of the undertaking. Inquiries have been sent out for 96-inch and 74-inch sheared plate mills and a 42-inch universal plate mill, all of which will be electrically driven. Specifications include three main mill motors, 100 small motors, shears, roll tables and from nine to 15 heating furnaces. Lifting equipment, including 12 electric cranes having capacities ranging from 10 to 50 tons, probably will be bought in Europe. The name of the prospective purchaser, now engaged in the manufacture of ship plates and munitions, has been withheld.

Will Furnish Helmets

The Simonds Mfg. Co., Fitchburg, Mass., and Lockport, N. Y., has received a contract from the United States government for steel helmets to cost $17,000,000. It was secured through the efforts of Alvan T. Simonds, who resigned as president of the company to accept a commission as captain in the ordnance department of the United States army. The large order will necessitate an addition to the steel plant in Lockport, and probably also in Fitchburg.

Starting New Foundry

The Standard Foundry Co., New Kensington, Pa., recently organized with a capital stock of $50,000, is putting into operation a jobbing gray iron foundry. Horton Penrose is president; M. F. Christian, vice president, and W. G. Kenney, secretary and treasurer. Mr. Kenney owns the Kenney Machine Co., New Kensington, Pa., and he and Mr. Christian are connected with the Keystone Mfg. Co.

Iron and Steel Financial News

Up-to-the-Minute Fact and Comment Collected and Sifted For Busy Readers

Federal Reserve System to Undergo Test

FINANCIAL circles are watching the money markets with keen interest for indications as to the effect of the flotation of the Liberty loan. Subscriptions were closed last Friday, when, as the world now knows, the loan was pronounced a great success. On the same day, the New York Call loan rate advanced to 6 per cent, the highest figure touched since last December. The causes advanced for this strength were the approach of the mid-year dividend and interest payments, on July 1, and the payment of 18 per cent of subscriptions to the government loan, on June 28. A reaction in the stock market followed the advance in the call rate and now Wall Street is wondering whether "dear money" is ahead.

While ordinarily the fluctuations of the call rate are of little concern to the manufacturer or merchant, they are of some interest now insofar as they supply an index to the money market. In addition to the $2,000,000,000 now being borrowed by the government, at least $3,000,000,000 more will be required this year. The competition of the government loans for funds contains possibilities of considerably higher rates, both for the stock market operator and for the ordinary commercial borrower. In any event we are at last to see a real test of the protective and regulative facilities of the federal reserve system. Experienced financiers, however, predict that the federal reserve system is amply fitted to cope with coming exigencies.

A slight reaction took place in the common stocks of most steel producers last week, although there was no particular market development. There is curiously little open speculation as to what will be the earnings of the Steel Corporation, when they are made public late in July. War-time contains so many uncertainties that even Wall Street statisticians are finding it difficult to make estimates as to steel earnings. But it is taken as a matter of course that the second quarter showing will be record-breaking. Wall Street's interest in the steel division is indicated by the fact that, although there are between 300 and 400 stocks listed on the stock exchange, one-fourth of the sales made the first five months of this year were of Steel common.

Bon Air Properties Go to W. J. Cummins

The bid of $1,600,000 of William J. Cummins, New York, at the chancery sale of the Bon Air Coal & Coke Co., Nashville, Tenn., has been accepted. Organized in 1902 with a capitalization of $5,000,000, the company acquired the Mannie furnaces, Allen Creek, Tenn., consisting of two stacks. These operated in conjunction with 200 beehive coke ovens at Eastland, Tenn., produced 72,000 tons of iron annually.

In 1910 the company went into receivership. The court ordered the properties to be sold. The Union Bank & Trust Co., trustees for the general mortgage bondholders put in an offer. The court allowed time for an advance on the bid of the bank. Mr. Cummins then put in his bid. About 170,000 acres of coal and iron land go with the furnaces.

Merge Blaw Steel and Knox Pressed Steel

The Blaw-Knox Co. is the new name of the corporation succeeding the Blaw Steel Construction Co., Pittsburgh, fabricator of shapes and transmission towers, with plant at Hoboken, Pa., and the Knox Pressed & Welded Steel Co. plant, Wheatland, Pa., manufacturer of open-hearth furnace accessories. The capital of the company will be $2,000,000. Present officers of the Blaw company retain their titles, and the board will be increased to take in five directors of the Knox company. The general sales offices of the company will remain in Pittsburgh with branch offices as heretofore. The executive offices will be at Hoboken.

New Company Takes Over Horseshoe Plants

The Manufacturers Iron & Steel Co. of New Jersey, New Brunswick, N. J., recently chartered with $8,000,000 capital, has elected the following officers: James W. Johnson, president; William J. McCurdy, vice president; Robert C. Nicholas, secretary, and George F. McCormick, treasurer. William J. McCurdy, vice president, states that the company is the re-incorporation of a New York company; and that the Manufacturers Iron & Steel Co. owns the entire stock of the Bryden Horse Shoe Co., Catasauqua, Pa.; the Neverslip Mfg. Co., New Brunswick, N. J., and the Neverslip Mfg. Co., Montreal, Quebec. The new corporation will make rivets, taps, horse shoes and horse shoe calks.

Mark Mfg. Co. Increases

The Mark Mfg. Co., Evanston and Chicago, which is building a large steel works at Indiana Harbor, has increased its capital from $10,000,000 to $25,000,000 under its Delaware charter. Officials of the company say this does not indicate further extensions than those already under way.

Form Scrap Company

The Duquesne Iron & Metal Co., Fulton building, Pittsburgh, has been organized by J. B. Stalnaker, president, and Robert Cargo, vice president. Mr. Stalnaker formerly was identified with the Ohio Iron & Metal Co., the Pittsburgh office of which is in charge of H. D. Stalnaker, a brother. Mr. Cargo formerly was connected with the John Eichleay Jr. Co., Pittsburgh. The Duquesne company is equipping a scrap yard on Beaver avenue, N. S. Pittsburgh.

Financial Crop Ends

To holders of each four shares of common held June 29, the Continental Can Co., Inc., Syracuse, N. Y., will offer one of an authorized issue of 20,000 common shares for subscription.

* * *

The Cleveland Metalcraft Co., Cleveland, has increased its capital from $25,000 to $100,000 and has made extensions to its plant which will facilitate the manufacture of metal furniture, tool racks, etc.

* * *

The Scioto Fire Brick Co., Sciotoville, O., for more than 45 years engaged in the manufacture of fire and paving brick, has disposed of its real estate and hold-

ings to the Harbison-Walker Refractories Co., Pittsburgh, Pa. Operation of the mines and plants will be continued by the latter company.

* * *

Reports to the effect that properties of the Seaman-Sleeth Co., Pittsburgh, roll manufacturers, have been acquired by New York interests, are denied officially.

* * *

William Cramp & Sons Ship & Engine Building Co., Philadelphia, has acquired the I. P. Morris Co., operator of a foundry and the Kensington Shipyard Co.

* * *

Outstanding bonds of the Youngstown Iron & Steel Co., Youngstown, O., recently acquired by the Sharon Steel Hoop Co., Sharon, Pa., will be retired July 1.

* * *

The Pennsylvania Engineering Co., New Castle, Pa., recently has increased its capital from $600,000 to $1,000,000. Stock dividends aggregating $300,000 will be distributed July 1, the remainder to be retained in the treasury.

* * *

The Jackson Fire Brick Co., Jackson, Tenn., has purchased the plant and business of the Hunt Pressed Brick Co., successors to the Southern Tile & Brick Works, Jackson, Tenn., makers of fire clay brick.

* * *

A new company to be known as the Frederick Iron & Steel Co. has been formed by W. A. Riddell, Hugh H. Obear, and Charles McC. Mathias. The new company has purchased the entire property of the Morris Iron & Steel Co., Frederick, Md., through Mr. Riddell.

* * *

Ownership of the J. H. Taylor foundry, Bridgeport, Conn., has been acquired by the Bullard Machine Tool Co., Bullard, Conn. J. H. VanYorx has been appointed manager. The foundry will be developed as a part of the Bullard organization.

* * *

The Washington Mold, Foundry & Machine Co., Washington, Pa., has commenced operations in the remodeled plant of the Crescent Glass Co. Officers of the company are: J. L. Scheli, president; W. J. Bromley, vice president; C. M. Bromley, secretary, and Charles Bromley, treasurer.

* * *

The United States Spring Co., Los Angeles, Cal., which it was recently announced will build a plant, is successor to the A. & F. Spring Co., manufacturer of automobile springs and bumpers. A site for the new building has not been obtained. Philip Riedele is president. Herbert Anthons vice president and John B. Rauen secretary-treasurer of the company.

* * *

The Stroh Casting Co., Detroit, maker of gray iron castings, is the successor to the New Standard Foundry Co., under recent change of name authorized by the stockholders. Horace C. Mills has been placed in charge of sales, with the title of sales director. The company during the past three years has built up a cupola capacity from 10 to 75 tons daily, specializing on automobile castings.

* * *

The Driver-Harris Wire Co., Harrison, N. J., has filed notice of change of name to the Driver-Harris Co. The former name did not comprehensively designate the products of the company. While wire makes up an important part of the production, alloys and pure metals in the form of strip, rods, sheets and castings largely are manufactured, as well as flexible heater cords and wire rope.

* * *

For the year ending Dec. 31, 1916, the Hall Switch & Signal Co., shows total sales of $928,660 and charges of $750,530 in its munitions business, or a net profit of $178,130, as compared with a loss of $11,489 on its switch aand signal production. This leaves a net profit of $166,641 later reduced, however, by sundry adjustments to $155,522. Orders for $700,000 worth of signal equipment now are held by the company.

* * *

The Trumbull Steel Co., Youngstown, O., has declared a 1 per cent extra dividend for Red Cross purposes. The dividend will amount to about $35,000. Other industrial companies are following the recent lead of the steel corporation in declaring an extra Red Cross dividend. The American Brake Shoe & Foundry Co. will disburse 7 per cent extra, of which 1 per cent will be in cash, 5 per cent in liberty bonds and 1 per cent for the Red Cross.

* * *

J. D. Dockendorff & Co., 20 Broad street, New York, export and import merchant, representing steel mills and manufacturers of kindred lines for export, recently has been incorporated with $500,000 capital. Officers of the company are: J. E. Dockendorff, president; V. J. Sudman, secretary and treasurer; F. Lagerholm, assistant secretary and G. M. Hasbrouck, assistant treasurer.

* * *

The Superior Steel Corporation, formerly the Superior Steel Co., with works at Carnegie, Pa., has removed its general offices from that city to the Union Arcade building, Pittsburgh. C. H. Forster, who was recently appointed secretary and treasurer of the Superior corporation, formerly was connected with the American Iron & Steel Mfg. Co., Lebanon, Pa., now cohtrolled by the Bethlehem Steel Corporation.

* * *

Stockholders of the Westinghouse Electric & Mfg. Co., Pittsburgh, have re-elected the retiring directors, J. D. Callery, Paul D. Cravath, Harrison Nesbit and James N. Wallace. The Westinghouse Machine Co. also re-elected its retiring directors, Guy E. Tripp, H. H. Westinghouse, J. D. Callery, E. M. Herr, H. T. Herr, William McConway, John R. McCune, Joseph W. Marsh and L. A. Osborne. Stockholders of both companies have approved merger plans which are now being worked out in detail.

Toluol Strong

In Expectation of Government Orders—Much Benzol is Wanted

New York, June 16.—Numerous additional inquiries for toluol have come out from companies which are expecting new contracts for trinitrotoluol for the government. Indications are that the government's requirements for an indefinite period will be in excess of the unsold supply. Prices are $1.75 to $2 per gallon, for spot and $1.50 to $1.75 for contract.

Transactions involving large quantities of benzol and phenol for shipment abroad, continue unclosed pending the perfection of arrangements at Washington for the purchase of supplies for the allies. In the meantime, considerable business for foreign governments is being placed through temporary agents in this country. This buying involved mainly spot and contract benzol and considerable spot phenol. Pure benzol continues to be quoted at 55 to 60 cents per gallon, both for spot and contract shipment. The market on phenol is slightly easier at 40 to 42 cents per pound, both for spot and contract.

Forward contracts continue to be made in solvent naphtha. Demand for this product, however, continues to lag behind the supply. The market continues at 18 to 25 cents per gallon for spot and at 18 to 22 cents for contract.

Sales of sulphate of ammonia this week involved spot exclusively and embraced only small quantities. No further contracting was done. Consumers generally have been covered to the end of this year and in most cases to next June. The market continues at $4.85 to $5 per 100 pounds, at seaboard, for spot and nominally at $4.40 to $4.50 for contract.

Coke Oven By-Products

Spot.

Per Gallon at Producers Plant.	
Pure benzol	$0.55 to .60
Toluol	1.75 to 2.00
Solvent naphtha	.18 to .25
Per Pound at Producers Plant.	
Phenol	$0.40 to .42
Per 100 Pounds at Seaboard.	
Sulphate of ammonia	$4.85 to 5.00

Contract.

Per Gallon at Producers Plant.	
Pure benzol	$0.55 to .60
Toluol	1.50 to 1.75
Solvent naphtha	.18 to .22
Per Pound at Producers Plant.	
Phenol (nominal)	$0.40 to .42
Per 100 Pounds at Seaboard.	
Sulphate of ammonia	$4.40 to 4.50

Shipbuilders' Orders Flood Market

Chicago & Northwestern Inquires for Huge List of Tools—French Concern Seeks Plate Mill Equipment—Cranes Are in Great Demand as Deliveries Are Postponed

EXPANSION of the country's shipbuilding facilities is the subject of dominant interest in the markets for machine tools and conveying equipment. The signing of the war budget bill by President Wilson last Friday, empowering the government to take over steel ships now building and to abrogate contracts for future work is expected to clear the way for speedy action on the fleet of standardized steel vessels. The plans of various established yards for enlarging their yards are progressing rapidly. Some big inquiries for equipment for such work are coming before builders and some big orders are being placed.

Shipbuilding Projects Nucleus of Trade Interest

Dealers report that the Baltimore Dry Dock & Shipbuilding Co., Baltimore, is understood to have completed its arrangements with the government and is going ahead with its expansion program. It has not yet closed for the list of 21 cranes of various types previously mentioned, but it has closed for punching and shearing machinery and other equipment. The Maryland Shipbuilding Co., Baltimore, which recently secured a government contract for six wooden hulls, is inquiring for six 5-ton cranes. C. H. Kastendike, Calvert building, Baltimore, has issued a list of 11 electric traveling cranes, 3 to 75 tons. The plans of the group of independent fabricating companies for construction of a plant for building standardized steel ships are fast approaching a stage where they will be ready for the attention of General Goethals. In case of his approval contracts will be let. It is rumored in machinery circles that the American Bridge Co. will construct a yard to consist of 27 ways, but this report has not been confirmed.

Demand for Ship Yard Equipment is Keen

Equipment builders are receiving frequent requests for figures as to prices and deliveries of ship yard machinery. Also, in many cases, they are being asked to outline the usual ship yard requirements and to give specifications to companies with more ambition than experience. Deliveries of special ship yard equipment steadily are being pushed further ahead. It is growing difficult to obtain deliveries on plate rolls in less than eight months. The supply of such machines is limited by the output of heavy forgings which, in turn, are in heavy demand for crank shafts and other essential work. Makers of the big motors which drive these rolls say they cannot make shipments in less than six months. Most types of cranes cannot be obtained in less than five to six months; some types, not for a year. Deliveries also are far deferred on punching and shearing machinery, plate planers, hydraulic equipment and other ship yard tools.

The Camden Forge Co. has placed a contract for two 5-ton and one 15-ton cranes with the Morgan Engineering Co., Alliance, O. The Morgan Engineering Co. and the Alliance Machine Co. were the only bidders on the three 350-tons cranes for the gun shop at the Washington navy yard, bids for which were opened recently. The American Smelting & Refining Co. has bought a copper charging machine. The Canton Steel Foundry Co., Canton, O., is erecting an addition, 93 x 600 feet, and will add two 75-ton cranes. A vocational school at Bayonne, N. J., is asking for a small list of tools, including lathes, shapers and milling machines. The Midvale Steel & Ordnance Co. and the Bethlehem Steel Co. continue to appear in the market from time to time for equipment in connection with their expansion programs to handle government munition work. Midvale has just bought two special charging manipulators. It has not taken an action on the several cranes for which it inquired some time ago, including one 150-tons ladle crane, two 40-ton hydraulic cranes and three 25-ton cranes. The Bethlehem Steel Co. has bought a 15-ton hydraulic press and also is considering purchase of equipment for its new proving grounds at Cape May, Md.

Tool Deliveries Begin to Tighten

The plants of some of the leading builders of machine tools are booked practically to capacity for a year ahead on government work. But even from these, owing to the lightness of railroad demand, it is possible to obtain some special railroad tools, for immediate shipment. The plants which have accepted shell contracts from the government are well equipped and only scattered inquiries for tools for shell-making are appearing. The government continues active in placing orders for arsenals and navy yards. Some of this business is being advertised. However, some special tools, including ordnance-making machinery, are being placed directly with builders who are specially fitted for such work. No large lists of tools of a commercial character are before the trade but sellers say that the aggregate of miscellaneous inquiries for a few tools is large. Prices continue to rise, most rapidly in the heavier types, where material means more than labor.

The bureau of supplies and accounts, navy department, will open bids July 3 on a list of tools for installation aboard the warships CALIFORNIA and TENNESSEE as follows: Four tool-room lathes, two extension-gap lathes, two column tool-room shapers, two radial drills, two sensitive drills, two universal milling machines, two 2-wheel emery grinders, two portable surface grinders, two electrically-driven drills capable of drilling steel up to ½-inch diameter, and two motor-driven hacksaws.

Chicago & Northwestern Issues Large List

A LIST issued by the Chicago & Northwestern railroad inquiring for 102 machine tools commands the attention of Chicago dealers. This list is published on page 1370. The greater part of this equipment is for general use in the various shops. Twenty-three of the tools are to be placed in an extension now being added to one of the Chicago shops. Unusually short time is given for bidding on this material and dealers expect the entire list will be bought. The Santa Fe and Illinois Central railroads have not yet closed on their former inquiries. Considerable equipment is expected to be purchased for the two large assembling plants at Rock Island, which are being planned by Westinghouse, Church, Kerr & Co. One of these

Builders of Battleships Specify High Grade Steel

When it comes to the crisis, the battleship must be *there*—and be there *strong*. Just one weak spot may prove an unredeemable disaster—particularly down in the engine room.

AGATHON STEELS

are made especially for the production of ***Connecting Rods, Crank Shafts, Driving Shafts, Pistons, Cams, Gears, etc.***

They insure safety, durability, reliability, economy.

Engine Builders who use AGATHON STEELS will be well rewarded.

PROTECT YOUR REPUTATION

"AGATHON" Chrome Nickel
"AGATHON" Chrome Vanadium
"AGATHON" Nickel Steels
"AGATHON" Vanadium
"AGATHON" Chrome Steel
"AGATHON" High Carbon
"AGATHON" Special Analyses

Our shipping facilities are favorable to speedy delivery anywhere

THE CENTRAL STEEL COMPANY

MASSILLON, OHIO

Detroit Office: 326-27-28 Ford Building, F. Walter Guibert, District Representative
Cleveland Office: Hickox Building, The Hamill-Hickox Co. District Representative
Chicago Office: Room 1370 Peoples Gas Building, 122 South Michigan Blvd.
A. Schaeffer, District Representative
Philadelphia Office: 902 Widener Bldg., Frank Wallace, District Representative
J E. Dockendorff & Co., 20 Broad St., New York, N. Y., General Export Agents.

is for the assembling of gun carriages and the other for shells. These projects, however, are still in the engineering stage. General conditions in the machine tool market are strong, renewed inquiries appearing after a period of comparative dullness. Numerous activities indicate that new contracts for munitions will be taken by several manufacturers whose former contracts had expired. Among these is the Oliver Typewriter Co., Chicago, which recently laid off part of its force and offered equipment for sale, but has withdrawn its offer and apparently has use for the machinery. The Briegel & Hagius Mfg. Co., Davenport, Ia., will build a shop at Rock Island to manufacture jigs and tools for the Root & Vandervoort Engineering Co, Moline, Ill., which has taken considerable work for the government.

The McDougal-Duluth Co. is preparing to erect a shipbuilding plant at Duluth. Its permanent character is indicated by the fact that the buildings will be of steel. The Evinrude Motor Co., Milwaukee, has plans well under way for a new plant. The General Motor Truck Co., Pontiac, Mich., is building a test house and plans to add a steel foundry. The Railway Motor Car Co. and the Standard Steel Car Co., both of Hammond, Ind., are building additions to their plants. Electric light and waterworks extensions contemplated involve considerable machinery. The Chicago sanitary district is asking bids on equipment for the Calumet sewage pumping station, including six vertical centrifugal pumps with motors and turbogenerators. Bremerton, Wash., will improve its waterworks and install new pumps. The Oklahoma Power & Transmission Co. is planning two hydroelectric pumps near Ada, Okla., to develop a maximum of 10,000 kilowatts. Paris, Ark., will install considerable electric light equipment.

France Inquires for Heavy Mill Equipment

FOR the first time in more than a year, builders of heavy rolling mill equipment in the Pittsburgh district have been asked to submit quotations on machinery for shipment to France where ironmasters already are completing well defined plans for domestic activity after the war ceases. Definite inquiries for a 96-inch, a 74-inch and a 42-inch plate mill, mill motors, shears, roll tables and heating furnaces have been sent out by a prominent French concern whose capacity now is devoted to the manufacture of munitions. The Youngstown Sheet & Tube Co., Youngstown, O., has awarded additional contracts for increasing its finishing mill capacity. Details of these orders were outlined on page 1279 of the June 14 issue of THE IRON TRADE REVIEW. Numerous inquiries are pending for electric cranes, deliveries of which are deferred from 3 to 12 months. Demand for punching and shearing equipment is described as heavy.

No Large Inquiries to Stimulate Cleveland Market

SUBSTANTIAL activity prevails in the Cleveland machine tool market, although transactions during the last 10 days have been less spectacular than those which were characteristic several weeks ago. A rubber concern closed recently for a fair-size list of general utility tools. No large inquiries have been received but the volume of small orders is large. Deliveries on milling machines are extremely slow; other tools are hard to secure in less than 90 days; a few small engine lathes are available for prompt shipment. Demand continues heavy for large boring mills, planers, heavy lathes and all types of cranes.

Canadian Shellmakers Buy in Cincinnati for Replacement

CINCINNATI machine tool builders report that some of the inquiries from shipbuilding firms that have been under negotiation for several weeks are now developing into orders. However, no large lists have been bought in this vicinity. Small and medium sized lathes are more plentiful. The export demand is now almost at a standstill, although there are a number of machines that are going forward on orders previously booked. A few tools have been bought by Canadian makers of war munitions for replacement purposes.

New Construction and Equipment

Concise and Timely Business Building Opportunities from the Field of Industry

Among New England Factories

BENNINGTON, VT. — The Edward L. Sibley Mfg. Co. will build a brick, mill construction, 1-story, 50 x 150-foot factory on West Main street.

NORTH BENNINGTON, VT.—The H. T. Cushman Mfg. Co. will build a wood and concrete, 2-story, 40 x 100-foot factory.

BOSTON.—The Huff Machine Works has been incorporated with $25,000 capital by Edward T. Roche, George L. Colburn, and William P. Everts.

BOSTON.—The White-Grerman Arms Co. has been incorporated to make fire arms with $500,000 capital by John B. Crapo, and Charles E. Grerman, Haverhill, Mass.

BOSTON.—The Liberty Arms Co. has been incorporated with $50,000 capital by Charles A. Williams, Otis S. Phillips, Joseph S. Donovan, and William C. Pree.

BOSTON.—The H. C. Freeman Co. has been incorporated to make hoisting machinery with $50,000 capital by Henry C. Freeman, Louis S. Freeman, and John R. Saylor.

BOSTON.—The McKean Turbine Co. has been incorporated with $10,000 capital by Hallet Lowell, E. A. McKean, Edward Gordan Ludham and Gardner Beals.

BOSTON.—The Little Engineering Co. has been incorporated with $50,000 capital by Norman J. MacGaffin, West Medford, Mass., et al.

CHELSEA, MASS.—The Bay State Smelting & Refining Co. has been incorporated with $25,000 capital by Harry Ficksman, Jacob Levendorf, and G. Ficksman.

CLINTON, MASS. — The Roubaix Mills, Inc., will build a brick and concrete, mill construction, 50 x 150-foot addition to its mill on North Main street.

EVERETT, MASS.—A permit has been issued to the General Electric Co. for a brick and steel, 2-story, 92 x 300-foot addition to its factory in West Everett.

EVERETT, MASS.—Plans will be ready soon for a brick, 3-story, 126 x 170-foot building for the Everett Trust Co. at Broadway and Chelsea street.

ONE
30-Ton Open Hearth
FURNACE
Now Ready.

Who wants the Entire Production of it for Ingots or Shell Blanks?

Hubbard Steel Foundry Co.
EAST CHICAGO, IND.
All Kinds of Iron and Steel Rolls and Steel Castings.

Say you saw it in THE IRON TRADE REVIEW

FALL RIVER, MASS.—J. B. Parent has plans for a steel, 3-story, 97 x 166-foot building to cost $100,000.

NEW BEDFORD, MASS. — The Pairpoint Co. will build a brick, 4-story, 200 x 100-foot addition to its plant.

NEW BEDFORD, MASS. — The Union Street Railway Co. is drawing plans for an 80 x 115-foot power station to cost $665,000. Harry M. Hope, 185 Devonshire street, Boston, is engineer.

NEWTON, MASS. — The Stanley Motor Carriage Co., maker of steam automobiles, has been taken over by a Delaware corporation capitalized at $2,500,000. Prescott Warren, Carleton F. Stanley, Frank Jay, and Edward M. Hallett, are the incorporators.

PITTSFIELD, MASS. — Robbins, Ganwell & Co. will build a 1-story machine shop, 47 x 70 feet, to cost $9000. D. H. Pike has the general contract.

WORCESTER, MASS.—The American Steel & Wire Co. has let the general contract for a brick, mill construction, 3-story, 64 x 123-foot factory, to cost $35,000, at its north works.

PROVIDENCE, R. I. — The McWilliams Mfg. Co. has been incorporated to do a machinery business with $30,000 capital by H. B. McWilliams, Thomas F. Tierney and George W. Bugbee.

BRIDGEPORT, CONN.—A. & E. Henkels, Inc., will build a power house, 1-story, 47 x 82 feet. Richard Johnson, 327 Trumbull street, has the general contract.

BRIDGEPORT, CONN. — The Gasorator Co. has been incorporated to make motor parts with $10,000 capital by Jesse G. Hawley, Claude A. Herman and Charles R. Hosch.

GREENWICH, CONN. — The Dalton Machine Co., 1911 Park avenue, New York, has purchased property on Potomac avenue on which it will build a brick factory and remove its business from New York.

HARTFORD, CONN.—The National Iron Works recently has been incorporated with $20,000 capital, by Harry Krasnow, Louis Joffer, and Nathan A. Schatz.

HARTFORD, CONN.—G. Fox & Co. has let the contract for a steel and concrete, 11-story, 142 x 176-foot building, to cost $1,200,000, to replace that recently burned.

MIDDLETOWN, CONN.—The Middletown Fire Arms & Specialty Co. has been incorporated with $50,000 capital by Dayton A. Baldwin, Fred F. Hodge and Lucius N. Diehm, West Hartford, Conn.

NAUGATUCK, CONN.—The Rubber Regenerating Co. has let the contract for a mill construction warehouse to cost $75,000.

NEW BRITAIN, CONN. — The Stanley Works has taken out a permit to erect a concrete, 7-story, 60 x 200-foot building to cost $130,000 on Myrtle street.

NEW HAVEN, CONN.—The Morris Steinert estate will build a brick and steel, 3-story, 50 x 100-foot business block.

NEW HAVEN, CONN.—The Connecticut agricultural experimental station, 123 Huntington street, has appropriated $28,000 for a central heating plant. E. H. Jenkins is director.

STAMFORD, CONN.—William J. O'Brien will build a brick and steel, 4-story building to cost $75,000 at South and Willow streets.

STAMFORD, CONN.—Baer Bros., manufacturers of bronze powder, 700 Canal street, have started work on a plant extension to be 3-story and cost $11,000.

Along the Middle Atlantic Seaboard

ALBANY, N. Y.—The Simmons Machine Co. will build a 75 x 120-foot plant addition.

ALBANY, N. Y.—The J. Hunter Heating & Construction Co. is planning alterations to its foundry.

BROOKLYN, N. Y.—The Paper Working Machines Co., Kent avenue, has bought a plant and a 5-acre tract on Jamaica Bay.

BROOKLYN, N. Y.—The American Machine Foundry Co., Fifty-sixth street and Second avenue, has awarded the general contract for a 4-story plant, 120 x 150 feet, to H. V. Best & Co., 52 Vanderbilt avenue, New York.

BROOKLYN, N. Y.—The Fidelity Metal Co., 196 Diamond street, is revising plans for a plant to be 3-story, 75 x 100 feet.

BROOKLYN, N. Y.—Work will start soon on a foundry addition for the Kestler Iron Works, Knickerbocker avenue and Ingraham street, to be 1-story, 50 x 109 feet.

BROOKLYN, N. Y.—The Arnold & Nissen Tool Co. has been chartered with $30,000 capital to manufacture tools and appliances by R. L. and A. W. Arnold and C. D. Nissen, 311 Seventh street.

BUFFALO. — The Scholler Mfg. Co. has been chartered with $10,000 capital to manufacture machinery, tools, etc., by C. J. and E. J. and C. Scholler.

BUFFALO.—The Pennsylvania railroad will build a 1-story power house addition, 22 x 49

Chicago & Northwestern Issues Huge Tool List

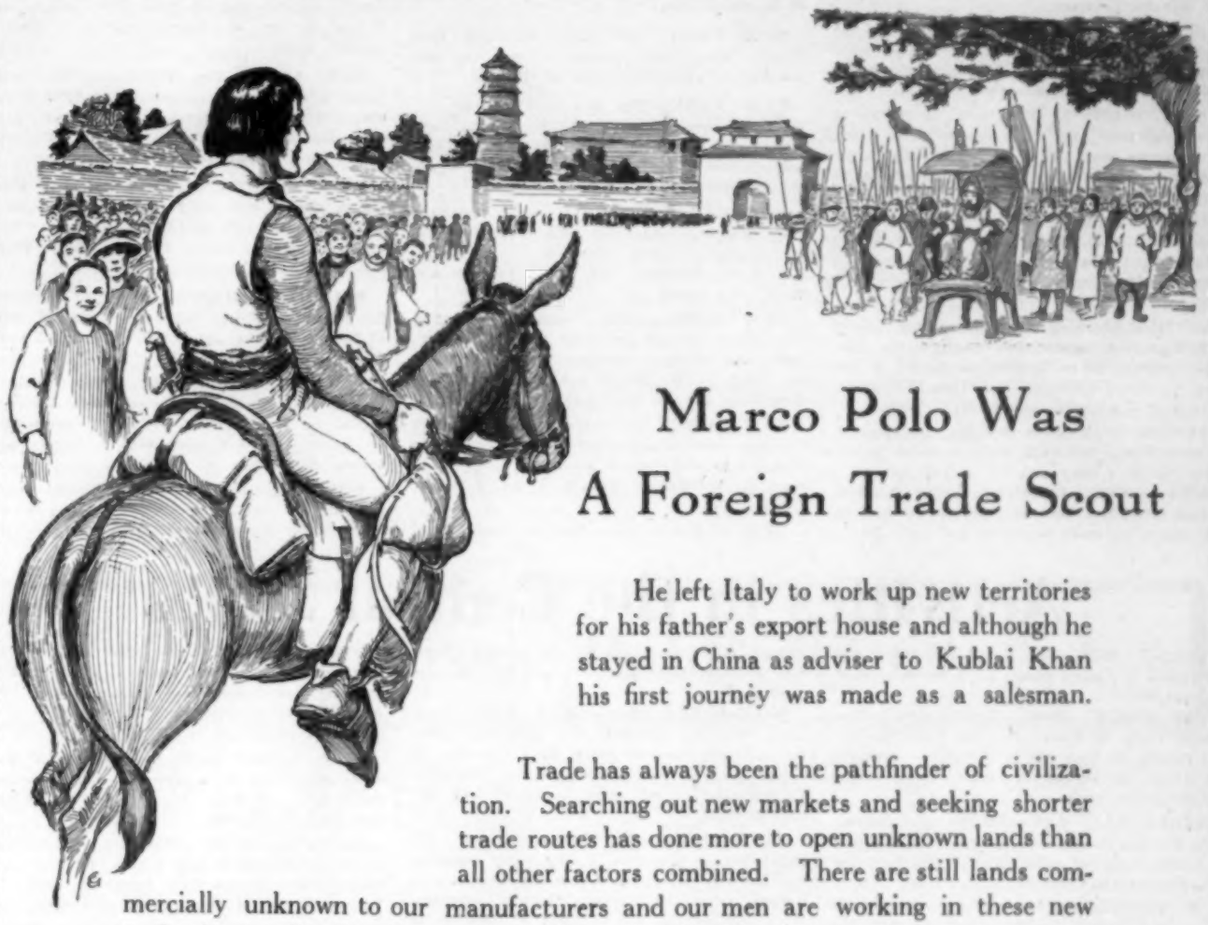
The Chicago & Northwestern Railroad, L. S. Carroll, Chicago, general purchasing agent, has asked bids on two lists.

GENERAL LIST

Three double-head bolt cutters.
One 16-inch lathe.
One 18-inch lathe.
One 20-inch lathe.
One 20-inch, heavy-duty lathe.
One 21-inch, rigid-turret lathe.
One 22-inch engine lathe.
One 24-inch engine lathe.
One 26-inch engine lathe.
Two 36-inch engine lathes.
One single-head axle lathe.
One wheel-turning lathe.
One 2-carriage, center-drive, journal-turning lathe.
Two 12-inch speed drills.
One 15-inch sensitive drill press.
One 16-inch sensitive drill press.
One 20-inch sensitive drill press.
Two 30-inch vertical drill presses.
One 36-inch vertical drill press.
One 40-inch heavy-drilling machine.
One 44-inch upright drill dress.
One 48-inch upright drill press.
Two 6-foot, full-universal radial drills.
One 8-foot radial drill.
Two 42-inch boring mills.
One 51-inch boring mill.
One guillotine shear.
One 48-inch rotary shear.
One horizontal punch, 15-inch throat.
One power-driven punch and shear, 36-inch throat, four sets of hand power rolls.
One bar shear.
One punch and shear, 50-inch throat.
One horizontal punch, 8-inch throat.
One splitting shear.
One single punch.
One plate-splitting and cross-cutting shear.
One combination punch and shear, 42-inch throat.
Two 24-inch crank shapers.
One 3½-inch horizontal boring machine.
One 30 x 39-inch, 20-ton power forging press.
Two 18-inch, double emery wheel grinders.
One 18 x 2-inch, combination emery grinder.
One 20 x 2-inch, combination emery grinder.
One vertical hammer.
One 100-pound helve hammer.
Three 800-pound, single-frame steam hammers.
Two portable cylinder boring bars.
One 26-inch, heavy-type, portable, valve-seat rotary planer.
One 28-inch heavy type portable valve-seat rotary planer.
One portable boring bar.
Two crank-pin turners.
Three pneumatic, sectional flanging presses.
One air-operated flanging clamp.
One 1-inch forging machine.
One 1-inch continuous motion bolt header.
One pneumatic, spring-banding press.
One pneumatic, spring-stripping machine.
One power hack saw.
One 400-ton, double-head wheel press.
Two boring bars.

FOR EXTENSION TO SHOP M-50

One 28-inch lathe.
One 48 x 48-inch x 16-foot, double-head. planer.
Two 24-inch shapers.
One 51-inch boring mill.
One 37-inch boring mill.
Two 18-inch lathes.
One double-spindle, rod-boring machine.
One 36-inch, double-head crank planer.
One 38-inch lathe.
Two 30-inch lathes.
One portable, No. 4, cylinder boring bar.
One 90-inch, universal radial drill press.
One 16-inch, lever drill press.
One 36 x 36-inch x 12-foot, double-head planer.
One 2 x 24-inch turret lathe.
One 4-spindle drill press.
Two 20-inch, wet tool grinders.
Two 18-inch, double emery wheel grinders.



Marco Polo Was A Foreign Trade Scout

He left Italy to work up new territories for his father's export house and although he stayed in China as adviser to Kublai Khan his first journey was made as a salesman.

Trade has always been the pathfinder of civilization. Searching out new markets and seeking shorter trade routes has done more to open unknown lands than all other factors combined. There are still lands commercially unknown to our manufacturers and our men are working in these new territories to discover the wants which you can supply.

This work is but one branch of the many departments which go to make up the Federal Export Corporation. Through its combined services is accomplished every detail of creating the demand, selling the goods, forwarding the shipment and financing the transaction. When you sell through the Federal you reduce lost motion to the lowest degree.

Possibly you have had direct inquiries for your products and have no time or desire to handle the many details contingent on securing the order. In this case we would be glad to have you send us the inquiry and we will take charge of making the sale, shipping the order and paying you at your door.

We invite your further inquiry as to applying our services to extending your export business.

FEDERAL EXPORT CORPORATION

115 Broadway, New York, U. S. A.

SHIPOWNERS, MANUFACTURERS' REPRESENTATIVES, BANKERS

feet. Frank G. Hanssel, White building, has the general contract.

BUFFALO.—The Stewart Motor Corp. has awarded the general contract for a plant addition, 40 x 124 feet, to the Neiderpreum Building Co., 1170 Jefferson street.

EAST VIEW, N. Y.—Clark, McMullen & Riley, engineers, 101 Park avenue, New York, have started work on a central heating, lighting and power plant for the Westchester county building commission.

LONG ISLAND CITY, N. Y.—Plans have been completed for a plant for the Oakes Mfg. Co., to be 2-story, 60 x 80 feet and cost $35,000.

LONG ISLAND CITY, N. Y.—The Premier Metal Etching Co., Fourteenth street and Van Alst avenue, has awarded the general contract for a 2-story plant, 75 x 100 feet, to cost $70,000, to J. O'Dell Whitenack, 231 West Eighteenth street, New York.

LYONS, N. Y.—The Niagara, Lockport & Ontario Power Co. will build a steam power plant, to be 2-story and 100 x 140 feet.

NEW YORK.—Russell, Holbrook & Henderson, Inc., has been incorporated with $25,000 capital to make machines and tools by L. Russell, C. H. Holbrook and L. G. Henderson, 70 Riverside Drive.

NEW YORK.—The Eagle Wrought Iron Works, Inc., 580 Jackson avenue, is improving its plant at a cost of $10,000.

NEW YORK.—The Beaver Chemical Co., recently organized with $10,000 capital, will manufacture chemicals, etc. H. and B. Lichtenberg and S. Fillin, 2013 Bryant avenue, are the incorporators.

NEW YORK. — The Stamping Products Corp. has been organized with $25,000 capital to manufacture metal molds by C. A. Anderson, S. B. Sherman and G. C. Steeves, 630 West 141st street.

NEW YORK. — The Daniels Construction Co., newly incorporated with $500,000 capital, will build railways, bridges and docks. W. D. Pratt, J. W. Black and E. Daniels, 233 Broadway, are the incorporators.

NEW YORK.—The Amalgamated Products Co. has been incorporated with a capital of $100,000 to make metal goods by C. H. Topping, A. W. Palmer and M. I. St. John, 27 Cedar street.

NEW YORK. — The Brettler Sheet Metal Works has been incorporated with $10,000 capital to manufacture iron floor plates by B. and A. and M. Brettler, 227 East Forty-seventh street.

NEW YORK.—The Refractory Magnesite Corp., a New Jersey corporation, capital $100,000, will mine manganese ores, copper ores, etc. The incorporators are: A. W. Britton, L. H. Gunther and Joseph F. Curtin.

PEEKSKILL, N. Y.—The Peekskill Mining & Milling Co. has been incorporated with $50,000 capital to mine and smelt ores. The incorporators are: J. J. Frawley, P. H. Wagner and P. E. Connors.

POUGHKEEPSIE, N. Y.—The Permalife Storage Battery Co. has been organized with $1,000,000 capital by E. P. Sheehy, E. T. Coffin and G. Pagnani.

SYRACUSE, N. Y.—The Stanley Vehicle Spring Co., newly organized with $100,000 capital by F. W. Green, W. H. Robinson and H. P. Denison will make vehicle springs and vehicle hardware.

YONKERS, N. Y.—The National Sugar Refining Co. has had preliminary plans drawn for a boiler house to cost $140,000.

Activities in the Central States

BELOIT, WIS.—The Beloit Burr Mfg. Co. will build a 2-story plant, 32 x 90 feet, costing $15,000.

EAU CLAIRE, WIS.—The Wisconsin-Minnesota Light & Power Co. has plans for improvements to cost about $100,000. Included are three benches of 13 retorts each, and a 250,000-gallon tank.

GREEN BAY, WIS.—The Fabry Construction Co. has taken the contract for erecting a 3-story fireproof plant, 100 x 300 feet, for the Alart & McGuire Co.

IRONWOOD, WIS. — A general contract for a new school building to cost $125,000 has been awarded to Tomlinson & Egan, Ashland, Wis.

MANITOWOC, WIS. — The Wisconsin Aluminum Foundry Co. has taken an order for 2,000,000 german silver bushings for army canteens. An addition, 30 x 190 feet, is being built and six additional furnaces are being installed.

MILWAUKEE, WIS.—Pawling & Harnischfeger will build a power plant addition, 50 x 50 feet, to cost $65,000.

MILWAUKEE. — Julius Rasmussen, 111 West Water street, leather belting, etc., has incorporated the business under the name of Julius Rasmussen Co., capitalization $40,000.

MILWAUKEE.—A 4-story building at 670 Clinton street, occupied by the Welsh Chemical Co. recently was damaged by an explosion.

MILWAUKEE.—Kirchhoff & Rose, architects, Majestic building, are preparing plans for a 5-story business block, 52 x 120 feet, on Grand avenue, for the Philip Gross Hardware Co., wholesale and retail hardware and mechanics' tools.

MILWAUKEE.—The Gemco Mfg. Co., 725 South Pierce street, is having plans prepared by Herman J. Esser, Camp building, for a 3-story reinforced concrete factory addition, 50 x 150 feet in size. Grant F. Discher is president and general manager.

RACINE, WIS.—Oscar Brachmann and M. Tullgren & Sons, Milwaukee, have taken a lease on a site, 80 x 240 feet, on Monument square, which is to be improved at a cost of about $250,000. Plans are being drawn for a theater, hotel and business block.

TWO RIVERS, WIS. — The Two Rivers Plating Co., which is engaging in the manufacture of metal parts used in the production of aluminum and other goods in addition to plating and re-tinning all kinds of metal castings soon will complete an addition.

DETROIT.—The Titan Motors Corp. has been incorporated with $350,000 capital by Louis Mendelsohn, A. A. Gloetzner and C. C. Kinkley.

DETROIT.—The Covert Gear Co., Lockport, N. Y., plans to build a plant at Detroit to manufacture heavy transmissions. A. A. Gloetzner is manager.

DETROIT.—The Woodworker Mfg. Co., recently chartered with $30,000 capital will make woodworking machinery. The incorporators are: William T. Fisk, E. G. Wasey and Mark L. Rowley.

MONROE, MICH.—The Monroe Chemical Co. has been incorporated with $10,000 capital to make chemicals by Joseph S. Kelly, C. W. and R. F. Hanneman, all of Detroit.

PONTIAC, MICH. — The General Motors Truck Co., W. L. Day, general manager, has plans for a 40 x 160-foot test house with a 60 x 126-foot wing, to cost about $40,000.

ST. JOHNS, MICH.—The Triangle Motor Truck Co. has been chartered with $50,000 capital by Eugene Hart, A. O. Hart and R. P. Hull.

WAYNE, MICH. — The Wayne Steering Wheel & Bow Co. is building a plant 50 x 175 feet.

YPSILANTI, MICH.—The Ypsi Screw Co. has been incorporated with $30,000 capital by C. T. Knight, W. M. Roberts and Stanley Kileski.

CHICAGO.—The By-Products Coke Corp., 108th street and Calumet river, will build a

Government Inquiries For Shop Equipment

The Navy Department, Bureau of Supplies and Accounts, Washington, is in the market for the machine tools listed in this box. Schedule numbers and place of delivery follow the specifications of the tools. Further information may be had on application from the Navy Department, Bureau of Supplies and Accounts.

One 24-inch, motor-driven, upright drill, 1244, Brooklyn.
One double on column emery grinder, 1244, Brooklyn.
One motor-driven grindstone, 1244, Brooklyn.
Four back-geared engine lathes, 1252, S. Charlestown, W. Va.
Twelve heavy projectile boring lathes, 1252, Charlestown, W. Va.
Seventeen heavy projectile turning lathes, 1252, Charlestown, W. Va.
Eleven 36-inch x 20-foot, motor-driven, triple-geared lathes, 1252, Charlestown, W. Va.
Four 36-inch x 14-foot, triple-geared lathes, 1252 Charlestown, W. Va.
One motor-driven, back geared, screw-cutting, tool-room lathe, 1244, Brooklyn.
Three 120-inch shrinkage turning lathes, 1239, Washington.
One 6000-pound ingot manipulator, 1243, S. Charlestown, W. Va.
One motor-driven milling machine, 1242, Washington.
One motor-driven, variable-speed milling machine, 1244, Brooklyn.
Eight heavy-duty, combination thread-milling and turret machines, 1252 Charlestown, W. Va.
Two 40-inch, saw cutting off machines, 1252, S. Charlestown, W. Va.
Three 24-inch, heavy-duty turret machines, 1252 Charlestown, W. Va.
Four 24-inch, heavy-duty motor-driven turret machines, 1252, Charlestown, W. Va.
One universal woodworking machine, 1240 Chelsea, Mass.

pumping station 34 x 42 feet to cost $25,000.

CHICAGO.—The Belden Mfg. Co., 2300 South Western avenue, has bought a site and will build a plant for the manufacture of insulating wire.

CHICAGO.—The Delta Iron & Furnace Co., recently has been organized in Delaware with $5,000,000 capital by R. H. Hollen, J. A. Nassen and D. Van Beakman.

CHICAGO.—The Armour Mechanical Co., capital $500,000, has been incorporated by George A. Robbins, A. Watson Armour and Frank B. Gifford.

CHICAGO.—The Chicago Fuse Mfg. Co. has bought a site at Congress and Morgan streets, on which it plans to build a 7-story factory costing $170,000.

CHICAGO.—The Western Union Telegraph Co. has bought property at La Salle and Van Buren streets, on which it plans to build a 6-story office building, 101 x 300 feet.

CHICAGO.—The Old Reliable Motor Truck Co. will build a 2-story addition, 100 x 160 feet, to enlarge its plant at Michigan avenue and Thirty-ninth street.

DECATUR, ILL.—The Decatur Malleable Iron Works will build an addition 80 x 100 feet.

ROCKFORD, ILL.—The Rockford Union Foundry Co. has been incorporated with $25,000 capital by Hugo L. Olson, W. A. Brolin and Shelby L. Large.

EVANSVILLE, IND. — The Wisconsin Smoke Consumer Co. has been chartered with $12,000 capital for the manufacture of smoke consumers by Henry C. Kleymeyer, F. R. Miller, William A. Koch and Daniel Wertz.

HAMMOND, IND. — The Standard Steel Car Co. will erect a factory, 180 x 400 feet, to cost $20,000.

INDIANAPOLIS.—The A. J. Meyer Mfg. Co., capital $20,000, will manufacture locks. The directors are: A. H. Meyer, Reginald J. Meyer and E. K. Braun.

INDIANAPOLIS. — The Dakin Emergency Safety Brake Co. has been organized with $50,000 capital to manufacture machinery by G. E. Dakin, M. A. Dakin and Samuel Dakin.

INDIANAPOLIS.—The Vanyo Lock Co., recently incorporated with $30,000 capital by Joseph Vanyo, Andrew Vanyo and Joseph T. Vanyo, will make door locks and machinery.

PERU, IND.—The Miami Screw Machine Products Co. has been incorporated wth $25,000 capital by V. A. Shortt, G. W. H. Welke, and J. C. Rice.

CINCINNATI. — Joseph Joseph & Bros., metal dealers, have purchased the Delphos branch of the Cincinnati, Hamilton & Dayton railroad for $194,000 and will scrap the entire equipment.

CLEVELAND.—The Kelly-Springfield Tire Co. will construct an 86 x 100-foot business block to cost about $175,000.

CLEVELAND. — The American Steel & Wire Co. recently made application for a permit to erect a $25,000 coal storage house for a by-product coke plant.

CLEVELAND.—The Truck Attachment Co., maker of auxiliary transmissions, etc., has leased a factory and will move its plant from Seattle, Wash.

CLEVELAND. — The Cleveland Aniline Products Co., a $50,000 corporation, has been chartered by Ben Feniger, Harvey Spilka, M. W. Kastriner, et al.

CLEVELAND.—The Cowles Tool Co. has been granted a permit to erect a $10,000 factory building.

New Trade Publications

CONTROL EQUIPMENT. — The Cutler-Hammer Mfg. Co., Milwaukee, has issued an attractive 32-page bulletin, describing control equipment for electric elevators. The types of control equipment manufactured by the Cutler-Hammer company include hand-rope, car-switch and push-button control. Many elevator accessories, such as switches, brakes, safety features, load lifting devices, etc., are also described in the bulletin.

BOILER COMPOUND.—A small 16-page bulletin has been issued by the Boiler-Kote Co., Chicago, describing the uses and applications of a boiler preservative. The compound is said to form a thin film over the iron of the boiler and as the film becomes heated in contact with the hot metal it expands and pries out the scale by mechanical force. It is claimed that after the scale is once away from the metal, the film of boiler compound prevents more scale from forming. Several pages of the bulletin are devoted to drawings of installations of apparatus for feeding the compound to the boiler.

TURBINES.—A 40-page booklet entitled "Progress in Water Works Design," was recently issued by the De Laval Steam Turbine Co., Trenton, N. J. The general economic and engineering conditions, which govern the design of steam turbine driven centrifugal pumps are described and illustrated. Installations of pumping units in several large cities are described. Several of these pumps are said to attain a daily pumping capacity of 100,000,000 gallons of water. Diagrammatic views of pumping apparatus enable readers of the bulletin to obtain a comprehensive idea of its operation. Other illustrations show De Laval turbines in operation.

PIPE.—"On the trail of Byers Pipe," is the title of a bulletin recently published by the A. M. Byers Co., Pittsburgh. The particular object of this booklet is to show the endurance qualities of wrought iron pipe. Photographs of many buildings in large cities of the United States are reproduced in the booklet all of which are equipped with Byers pipe. These buildings are of the older class, and accompanying each one of them is an account of the service rendered by its pipe. The experience had with pipe in many of the buildings illustrated, show that the minimum life of wrought iron pipe is 16 years, while the maximum life is upwards of 40 years.

COAL TIPPLES. — Two 16-page bulletins devoted to coal tipples are being distributed by the Link-Belt Co., Chicago. One of these bulletins is devoted exclusively to a description of the recently completed Blue Diamond Coal Co., tipple at Cardiff, Ky. The other bulletin describes coal tipples in general and illustrates several installations. The latter bulletin explains the departure from the old to the new methods of handling coal, shows the conditions which make coal tipples a necessity and describes the entire process of screening and sorting out coke. In conjunction with this description are diagrammatic views which enable the reader to obtain a comprehensive idea of the entire system.

SOOT BLOWERS.—"How Some Shipowners Have Increased Their Profits" is the title of a unique booklet issued by the Diamond Power Specialty Co., Detroit, to describe the uses of its mechanical soot blower on marine boilers. An interesting feature of the pamphlet is a comparison between the costs of hand cleaning and mechanical cleaning of boilers. A discussion of the characteristics of soot and its heat insulating properties serves to indicate the savings effected by keeping boiler tubes free from soot formations. Numerous illustrations and diagrams add to the value of the booklet. Several of these show the method of applying soot blowers to marine boilers.

INDUSTRIAL WASHING MACHINES.—Washing machines for use in industrial plants are described in a booklet issued by the American Laundry Machinery Co. The use of various rags and waste to clean machinery has become an almost universal practice and until recently, these cloths have been so cheap that they could be discarded after soiling. However, the rising cost of materials makes this practice uneconomical and introduces a demand for equipment to clean the soiled cloths. To meet this demand the American company has designed a number of machines to wash, wring and dry cleaning cloths. The booklet describes these machines in detail, shows illustrations of installations and indicates the savings which may be effected through their use.

PIPE AND FITTINGS. — The Duriron Castings Co., Dayton, O., describes its products in an attractive, recently issued bulletin. The cast metal made by the Duriron company is designed to resist acid and alkalies. Tests on the resistivity of the metal to various corrosive agents are outlined in the new booklet. Although very fluid when melted, permitting of pouring into thin sections, the metal is said to be unusually hard when solidified and must be finished to shape and size by grinding. Standard lengths of pipe of various forms are one of the chief products of the company. In addition to pipe, the company makes a large number of pipe fittings and appliances, such as valves, pumps, sinks and tanks. The pamphlet is well illustrated and contains considerable data in regard to the company's products.

HOISTS.—A 32-page bulletin was recently issued by the Wright Manufacturing Co., Lisbon, O., devoted to descriptions of steel hoists, hand cranes and steel trolleys. Three kinds of hoists are described of which the high speed or spur geared hoist is said to be the most efficient type for hard and heavy service. It is said that with a 1-ton hoist of this type, one man can lift the full load by overhauling 30 feet of hand chain with a pull of 82 pounds, while with the 2-ton size ti requires 120 pounds pull and a hand chain overhaul of 120 feet. Hoists of 20 tons capacity are said to require a pull of 135 pounds. The hoists are built in capacities of from ½ to 30 pounds. The bulletin also describes each individual part as to its function, composition, etc. Specification tables, prices and telegraphic codes are also included in the bulletin.

Iron and Steel Prices

Corrected to Tuesday noon

IRON ORE

Superior Ores, Per Ton, Lower Lake Ports.	
Old range Bessemer, 55 iron	5.95
Mesabi Bessemer, 55 iron	5.70
Old range non-Bess., 51½ iron	5.20
Mesabi non-Bess., 51½ iron	5.05
Port Henry Ores, non-Bessemer, Per Unit,	
Delivered Eastern Pennsylvania.	
Old Bed, crude 55 iron	10.50c to 11.00c
Old Bed., concent., 65 iron	11.00c to 11.50c
Harmony, concent., 63 iron	11.50c to 11.75c
Lump (at mines)	$5.75

WAREHOUSE PRICES

Steel bars, Chicago	4.50c
Steel bars, Cleveland	5.00c
Steel bars, Detroit	4.50c
Steel bars, Philadelphia	5.00c
Steel bars, New York	5.00c
Steel bars, St. Louis	4.55c
Steel bars, Cincinnati	4.65c
Steel bars, St. Paul	4.60c
Steel bars, over 3-in., Buffalo	4.50c
Steel bars, Buffalo	4.40c
Iron bars, Chicago	4.50c
Iron bars, Cleveland	4.95c
Iron bars, Detroit	4.50c
Iron bars, St. Louis	4.45c
Iron bars, Cincinnati	4.65c
Iron bars, Philadelphia	4.75c
Iron bars, New York	4.75c
Shapes, Chicago	5.00c
Shapes, Detroit	5.00c
Shapes, St. Louis	5.05c
Shapes, St. Paul	5.10c
Shapes, New York	5.25c
Shapes, Cleveland	5.25c
Shapes, Philadelphia	4.75c to 5.00c
Shapes, Buffalo	4.60c
Shapes, Cincinnati	5.00c
Plates, Chicago	7.00c to 8.00c
Plates, Detroit	8.00c
Plates, St. Louis	7.05c
Plates, St. Paul	7.10c
Plates, New York	9.09c
Plates, Cleveland	7.50c
Plates, Philadelphia	9.50c to 10.00c
Plates, Cincinnati	9.00c
No. 10 blue anl. sheets, Chi.	9.60c
No. 10 blue anl. sheets, Cleve.	8.00c
No. 10 blue annealed, Buffalo	4.50c
No. 10 blue anl. sheets, St. L.	9.05c
No. 10 blue anl. sheets, Cinci.	9.00c
No. 10 blue anl. sheets, St. Paul	9.10c
No. 10 blue annealed, Detroit	8.00c
No. 28 black sheets, Chicago	9.00c
No. 28 black, Cleveland	8.25c
No. 28 black sheets, Cincin.	8.15c
No. 28 black, Detroit	8.00c
No. 28 black sheets, St. L.	9.05c
No. 28 black sheets, St. Paul	9.10c
No. 28 galv. sheets, Chicago.	11.00c
No. 28 galvanized, Cleveland.	10.00c
No. 28 galv. sheets, Cincin.	10.15c
No. 28 galvanized, Detroit	11.00c
No. 28 galv. sheets, St. L.	11.20c
Hoops, Cleveland	6.00c
Hoops, Detroit	6.00c

IRON AND STEEL SCRAP

STEEL WORKS USE

(Gross Tons)

Bundled sheets, Pittsburgh	$25.00 to 26.00
Bundled sheets, Cleveland	22.00 to 24.00
Bundled sheets, Buffalo	16.50 to 17.00
City wrought, short, N. Y.	28.00
Frogs, switches, guards, St. L.	40.00 to 42.00
Heavy melting steel, Pitts.	44.00 to 47.00
Heavy melting steel, Buffalo	40.00 to 41.00
Heavy melting steel, Chicago	40.00 to 41.00
Heavy melt'g steel, Cleveland	40.00 to 42.00
Heavy melting steel, Cinci.	36.50 to 37.00
Heavy melting steel, east. Pa.	33.00 to 34.00
Heavy melt'g steel New York	30.00
Heavy melting steel, St. L.	44.00 to 46.00
Heavy melt'g steel, Birming.	23.00 to 25.00
Hydraulic pressed sheets, Cleve.	28.00 to 29.00
Hydraulic press. sheets, Pitts.	35.00
Hydraulic pressed sheets, Chgo.	31.00 to 32.00
Low phos. steel, Buffalo	50.00 to 55.00
Low phos. steel, Pittsburgh	45.00 to 55.00
Low phos. steel, eastern Pa.	52.50 to 55.00
Shoveling steel, Chgo.	38.50 to 39.00
Shoveling steel, St. Louis	36.50 to 37.50
Steel rails, short, Chicago	47.00 to 48.00
Steel rails, short, Cleveland	43.00 to 44.00
Steel rails, short, St. Louis	45.00 to 47.50
Steel rails, old, Birmingham	26.00 to 28.00
Stove plate, Cincinnati	19.75 to 20.00
Stove plate, St. Louis	22.00 to 23.50
Stove plates, N. J. points	18.00 to 18.50
Stove plate, Birmingham	15.50 to 16.50
Stove plate, Buffalo	18.00 to 18.50
Stove plate, eastern Pa.	21.00 to 22.00
Stove plate, Pittsburgh	25.00

(Net Tons)

Boiler plate, cut, No. 1, Chgo.	27.00 to 28.00
Boiler plate, cut, No. 1, St. L.	24.00 to 25.00
Bundled sheet, Cincinnati	23.00 to 23.50
Knuckles, coup., Chicago	43.00 to 44.00
Knuckles, coup., St. Louis	36.00 to 37.00
Springs, Chicago	44.00 to 45.00
Stove plate, Chicago	24.50 to 25.00
Stove plate, Cleveland	

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:	
Cleveland	$0.95
Newark, N. J.	2.98
Boston	3.18
Philadelphia	2.78
Pittsburgh	.95
St. Louis	3.18
Minneapolis, St. Paul	4.54
Buffalo to:	
Albany, N. Y.	$1.26
New England (rail)	2.58
New York and Brooklyn (rail)	2.58
Virginia furnaces to:	
Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88
Birmingham, Ala., to:	
Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
Minneapolis, St. Paul	5.85
New York (r. and w.)	4.25
Philadelphia (r. and w.)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
St. Louis	3.40
Chicago to:	
Des Moines	$2.80
Milwaukee	.50
Minneapolis, St. Paul	2.00
Moline, Ill.	1.40
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58
Minneapolis, St. Paul	4.54
Duluth, Minn., to:	
Minneapolis-St. Paul	$1.25
Mayville, Wis.:	
Minneapolis-St. Paul	$1.75

Freight Rates, Finished Material

Pittsburgh, carloads, per 100 lbs., to:	
New York	16.9 cents
Philadelphia	15.9 cents
Boston	18.9 cents
Buffalo	11.6 cents
Baltimore	15.4 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Detroit	15.7 cents
Minneapolis and St. Paul	32.9 cents
Denver	83.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	73.9 cents
Pacific coast (tin plate)	70 cents
Pacific coast, via Panama	61.0 cents

IRON MILL USE

(Gross Tons)

Busheling No. 1, Buffalo	27.00 to 28.00
Busheling, No. 2, Buffalo	18.00 to 19.00
Busheling, No. 1, Pittsburgh	27.00 to 28.00
Cast borings, New York	15.00 to 15.50
Cast borings, eastern Pa.	20.00 to 21.00
Cast borings, Buffalo	14.50 to 15.00
Cast borings, Pittsburgh	22.00 to 23.00
City wrgt., long, New York	38.00
Forge flashings, small, Cleve.	30.00 to 31.00
Forge flashings, large, Cleve.	30.00 to 31.00
Forge, No. 1, eastern Pa.	22.50 to 23.50
Grate bars, Buffalo	18.00 to 18.50
Grate bars, N. J. points	18.00 to 18.50
Iron axles, Pittsburgh	55.00 to 60.00
Iron axles, Cincinnati	45.00 to 46.00
Iron axles, eastern Pa.	48.00
Iron axles, Buffalo	50.00
Iron rails, Chicago	48.00 to 48.50
Iron rails, Buffalo	29.50 to 30.00
Iron rails, Cincinnati	36.00 to 36.50
Iron rails, St. Louis	46.00 to 47.00
Iron rails, Cleveland	45.00 to 47.00
Machine turnings, Buffalo	17.00 to 18.00
Mch. shop turnings, New York	14.00 to 14.50
Mach. shop turnings, Pitts.	22.00 to 23.00
Mch. shop turnings, east. Pa.	18.00 to 19.00
Machine turnings, Birming.	9.50 to 10.00
R. R., mch. cast, No. 1, Buff.	30.00 to 31.00
R. R. wrought, 1, Buffalo	44.00 to 45.00
R. R. wrgt., No. 1, east. Pa.	45.00 to 50.00
R. R. wrought, No. 1, Pitts.	45.00 to 47.00
R. R. wrought, 1, B'ham	31.00 to 32.00
Wrought pipe, Buffalo	31.00 to 32.00
Wrought pipe, eastern Pa.	38.00 to 40.00
Wrought pipe, New York	33.00

(Net Tons)

Angle bars, iron, Chicago	$49.00 to 50.00
Angle bars, steel, St. Louis	39.00 to 40.00
Arch bars & transoms, St. L.	44.00 to 45.00
Arch bars & transoms, Chgo.	49.00 to 50.00
Busheling, No. 1, Chicago	34.00 to 35.00
Busheling, No. 1, Cincinnati	22.00 to 22.50
Busheling, No. 1, Cleveland	24.00 to 25.00
Busheling, No. 1, St. Louis	27.50 to 28.50
Busheling, No. 2, Chicago	28.00 to 29.00
Cast borings, Cincinnati	14.00 to 14.50
Cast borings, Cleveland	20.50 to 21.50
Cast borings, St. Louis	17.00 to 17.50
Cast borings, Chicago	19.00 to 20.00
Cut forge, Chicago	41.00 to 42.00
Grate bars, Cleveland	20.00 to 21.00
Iron axles, St. Louis	49.00 to 50.00
Iron axles, Chicago	58.00 to 59.00
Iron axles, Cleveland	51.00 to 52.00
Machine shop turnings, Chgo.	19.00 to 20.00
Mach. shop turnings, Cleve.	17.00 to 18.00
Machine shop turn'gs, Cinci.	14.00 to 14.50
Mach. shop turnings, St. L.	18.50 to 19.00
Pipes and flues, Cleveland	28.00 to 29.00
Pipes and flues, Chicago	31.00 to 32.00
Pipes and flues, St. Louis	25.00 to 26.00
Railroad wrought, 1, Cleve.	34.00 to 35.00
Railroad wrgt., No. 1, Chgo.	45.00 to 46.00
Railroad wrought, 1, Cinci.	36.00 to 36.50
Railroad wrought, 1, St. L.	40.00 to 41.00
Railroad wrgt., No. 2, Chgo.	41.00 to 42.00
Railroad wrought, 2, St. L.	38.00 to 39.00

IRON OR STEEL WORKS USE

(Gross Tons)

Axle turnings, Cleveland	$22.00 to 23.00
Axle turnings, Buffalo	22.00 to 23.00
Shafting, New York	40.00 to 42.00
Shafting, eastern Pa.	50.00 to 52.50
Steel car axles, Birmingham	40.00 to 41.00
Steel car axles, New York	51.00 to 52.00
Steel car axles, Buffalo	50.00
Steel car axles, Cleveland	52.00 to 54.00
Steel car axles, Pittsburgh	55.00 to 60.00
Steel car axles, eastern Pa.	60.00 to 65.00

(Net Tons)

Shafting, St. Louis	39.00 to 40.00
Steel car axles, St. Louis	49.00 to 50.00
Steel car axles, Chicago	54.00 to 56.00

IRON FOUNDRY USE

(Gross Tons)

Car wheels, (iron), Pitts.	$43.00 to 45.00
Car wheels, (steel), Pitts.	50.00
Car wheels, Chicago	38.00 to 39.00
Car wheels, eastern Pa.	32.00 to 33.00
Car wheels, Buffalo	31.00 to 32.00
Car wheels, New York	29.00 to 30.00
Car wheels, St. Louis	36.00 to 36.50
Car wheels, Birmingham	25.00 to 26.00
Car wheels, Cleveland	33.00 to 35.00
Tram car wheels, Birming.	24.00 to 26.00
Cast, 1, heavy, N. J. points	31.00 to 32.00
Cast, 1 machy., N. J. points	31.00 to 32.00
Cast, No. 1, eastern Pa.	35.00
Cast, No. 1, Pittsburgh	35.00 to 38.00
Cast, No. 1, Birmingham	27.50 to 28.50
Malleable railroad, Cincinnati	21.50 to 22.00
Malleable railroad, Cleveland	35.00 to 36.00
Malleable railroad, Buffalo	34.00 to 35.00
Malleable railroad, Pittsburgh	30.00 to 32.00
Malleable railroad, east. Pa.	31.00 to 33.00

(Net Tons)

Cast No. 1, Cleveland	28.00 to 29.00
Cast, No. 1, Chicago	32.50 to 33.00
Cast, No. 1, Cincinnati	27.00 to 27.50
Cast, No. 1, St. Louis	30.00 to 31.00
Malleable railroad, Chicago	32.00 to 33.00
Malleable railroad, St. Louis	27.00 to 28.00
Malleable agricultural, Chgo.	28.00 to 28.50

MISCELLANEOUS USES

(Gross Tons)

Reroll. rails, 5 ft. & ov., Pitts.	50.00
Reroll. rails, 5 ft. & ov., Chgo.	47.00 to 47.50
Reroll. rails, 5 ft., & ov., E. Pa	40.00 to 42.00
Reroll. rails, 5 ft. & ov., St. L.	50.00 to 55.00
Reroll. rails, 5 ft. or ov., Cleve.	45.00 to 46.00
Rerolling rails, long, Birming.	31.00 to 32.00

(Net Tons)

Boiler punchings, Chicago	40.00 to 41.00
Locomotive tires, Chicago	50.00 to 51.00
Locomotive tires, St. Louis	47.00 to 48.00